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ABSTRACT

Presented are 11 technical papers, position statements and instructional programs on the severely handicapped. Included are the following titles: "A Public School Program for Severely and Profoundly Handicapped Students: Zero Exclusion," "Components of Instructional Programs for Severely Handicapped Students," "Procedures of Task Analysis as Related to Developing Instructional Programs for the Severely Handicapped," "Evaluation of the Severely Retarded and Multiply-Handicapped: An Alternative," "Community Transportation: Teaching Severely Handicapped Students to Ride a Public Bus System," "Teaching Orthopedically Handicapped Adolescents to Secure Selected Products and Services from Their Community Through Functional Use of the Yellow Pages and Telephone," "A Comparison of Two Procedures for Teaching Severely Handicapped Students to Differentially Respond to Individual Components of Language Cues," "Skill Sequences and Programming for the Severely Handicapped: Use of a Math Skill Sequence in the Instruction and Evaluation of Severely Handicapped Students," "Skill Sequences and Curriculum Development: Application of a Rudimentary Developmental Math Skill Sequence in the Instruction and Evaluation of Severely Handicapped Students," "Teaching Trainable Level Multiply Handicapped Students to Use Picture Cues, Context Cues, and Initial Consonant Sounds to Determine the Labels of Unknown Words," and "Teaching Social Interaction Skills to Severely Handicapped Students." (LS)

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# Madison's Alternative for Zero Exclusion: A Book of Readings

Volume V

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Tim Crowner
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Robert York

June, 1975

Dr. Bill Tilley
Director
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# Overview

This book is a collection of technical papers, position statements, and instructional programs that have been produced by persons in the Department of Studies in Behavioral Disabilities at the University of Wisconsin and by persons functioning with severely handicapped students in the Madison Public School system. However comprehensive in appearance the contents of this volume should be viewed as representative of only some of the ways in which educational and allied services were provided to severely handicapped students in the Madison Public School system. There are many teachers, physical therapists, occupational therapists, nurses, physical educators, etc. in the Madison Public School system who have developed imperious and effective services that unfortunately are not presented here.

There are three major reasons for developing and compiling the works presented in this volume. First, to communicate that statements attributing limits to the ultimate functioning of severely handicapped students are at this point in time premature. We are constantly astounded, impressed and encouraged by the nature, relevance and complexity of skills students who were once referred to as hopeless and rejected are now acquiring. If we as educators assume and expect all students to develop, then no change will be too small to sustain involvement, all failure will be temporary and instructive, and the joys and sorrows we experience interacting with our students continue to offer hope and encouragement.

Second, we hope that the information contained in this volume can be used to provide concrete examples of how a small group of persons relate to severely handicapped students in an educational environment. Certainly, we do not imply or extrapolate that the programs described here will be as effective with any other student or students. On the other hand we have tried to present reports of our instructional activities, service models, training programs, etc. in as precise a manner as appears practical. Hopefully, the strategies used here can be adapted, revised, expanded and otherwise localized for use with students and teachers in other settings.

Third, this volume is but a component in an evolutionary chain. Four similar documents preceded this and others will no doubt follow. As we examine the contents of those earlier volumes many of the mistakes we have made in many different domains are obvious, painful and embarrassing. At the same time we also feel that we have made progress in our quest to provide the best possible service in the most humane and dignified environment to the students we know and love.

# A PUBLIC SCHOOL PROGRAM FOR SEVERELY AND PROFOUNDLY HANDICAPPED STUDENTS: ZERO EXCLUSION

T. Timothy Crowner

Madison Public Schools[1]

## Rationales

This paper is intended as a review of selected observations and concerns encountered over a three year period during which time the public schools of Madison, Wisconsin, have operated a zero exclusion service model for severely and profoundly handicapped students.

A brief overview is presented which, rather than delineating specific procedures, outlines a variety of considerations which should be made as programs are being established. The reader is referred to other documents available from Madison Public Schools for specific procedures which are too cumbersome to present here.[2]

The Bureau of Education for the Handicapped of the United States Office of Education defines the classification, severely handicapped, as including:

> Those who because of the intensity of their physical, mental, or emotional problems, or a combination of such problems, need education, social, psychological, and medical services beyond those which are traditionally offered by regular and special education programs, in order to maximize their full potential for useful and meaningful participation in society and for self-fulfillment.
>
> A. The term includes those children who are classified as seriously, emotionally disturbed (including children who are schizophrenic or autistic), profoundly and severely mentally retarded, and those with two or more serious handicapping conditions, such as the mentally retarded blind, and the cerebral palsied deaf. B. "Severely handicapped children" 1. May possess severe language and/or perceptual-cognitive deprivations and, evidence of abnormal behaviors such as: I. Failure to respond to pronounced social stimuli, II. Self-mutilation, III. Self-stimulation, IV. Manifestation of

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[1] The development and dissemination of this paper was supported in part by Madison Public Schools, Federal Contract No. OEC-0-74-7993, and in part by Grant No. OEG-0-73-6137 to the University of Wisconsin-Madison from the Department of HEW, Bureau of Education for the Handicapped, Division of Training Programs, Washington, D.C.

[2] Documents which may prove valuable to the reader involve multi-disciplinary team procedures and evaluation designs. These documents may be obtained by writing the author in care of Madison Public Schools, Madison, Wisconsin.

intense and prolonged temper tantrums, and V. The absence of rudimentary forms of verbal control, and 2. May also have extremely fragile physiological conditions. (Federal Register, Vol. 40, No. 35, Feb. 20, 1975, p. 7412)

An early article on severely handicapped in public schools, by Sontag, Burke, and York (1973) sites a number of legal decisions which have closed the public school's option to exclude students on the basis of their handicap. In addition to legal mandates enumerated in such articles, support for providing public school services to severely and profoundly handicapped students derives from cost comparison data, Table I, which indicates the per student cost differential between the public school system and other local educational/residential facilities.

Table I

COST COMPARISON FOR SERVING
PERSONS WHO ARE SEVERELY HANDICAPPED

| | |
|---|---|
| The yearly cost to support a resident at Central Wisconsin Colony (a state residential center). . . . . . . . . . . . . . | $17,000 |
| The yearly cost to support a student at Lake Shore Manor (a large nursing home facility). . . . . . . . . . . . . . . . | $ 7,200 |
| The yearly cost to support a student at Orchard Hill (a group living facility for 90 retarded students) . . . . . | $ 6,256 |
| The yearly cost to support a student in a foster care home is . . . . . . . . . . . . . . . . . . . . . . . . . . | $ 4,200 |
| The yearly cost to support a student in client programs of the Madison Area Association for Retarded Citizens (5% of this figure comes from non-taxed based revenues) . . | $ 3,444 |
| The yearly cost to support a client at Madison Opportunity Center (a sheltered workshop). . . . . . . . . . . . . . . . . | $ 2,860 |
| The yearly cost per pupil for Madison Public Schools . . . . | $ 1,700 |
| The yearly cost per pupil in programs for severely handicapped, operated by Madison Public Schools. . . . . . . | $ 3,286 |

Considering the figures in Table I, if parents choose to keep their child at home and use the public school program for 21 years, the savings to the taxpayer is $287,994 or the cost of 21 years in school versus the cost of 21 years in Central Colony. If, after this 21 years, the student moves into Orchard Hill and goes to work at Madison Opportunity Center for the next 42 years, the savings to the taxpayer over a Central Colony placement would be $331,128 or the cost of 42 years at Orchard Hill and Madison Opportunity Center versus

42 years in Central Colony. The sum of tax savings over a lifetime of 63 years for this person is $619,122. Of course there are a variety of options from which a parent may choose. The important point is that options which support students in smaller units such as small group homes tend to be cheaper.

Based on the rationales above and under the guidance of Chapter 89, Laws of Wisconsin, 1973 (right to education of the handicapped), Madison Public Schools has initiated a zero exclusion program for severely and profoundly handicapped individuals. It is the intention of this program to develop competencies in students which will enable them to survive in smaller, less restrictive, more humane, and economic environments.

## Definition

"Zero Reject" education is a model introduced by Lilly (1971). The intention of Lilly's model is to support students in the public school mainstream through a system of advocacy procedures. Like the zero reject model, the zero exclusion model is a series of advocacy procedures. However, zero exclusion is intended to extend public school services to students who, traditionally, have been considered "too handicapped" to be managed in, or to benefit from, a public education. Zero exclusion refers to a model in which no student, regardless of the degree or condition of his handicap, is denied access to the services of public school personnel. These personnel may include teachers, physical therapists, occupational therapists, speech and language therapists, psychologists, social workers, mobility specialists, special area teachers such as music, art, physical education, or any other disciplines normally delivering services within public school systems.

It should not be assumed that zero exclusion is simply a matter of setting aside a space and hiring some new personnel to serve an additional student population. When a school district implements a zero exclusion model there is a profound impact on the entire district. In addition to draining already strained budgets and resources, zero exclusion affects the population of students already being served. The arrival of severely and profoundly handicapped students into public school hastens the need for "zero reject" models for more mildly handicapped students. For example, Madison now operates most of its programs for moderately retarded students in regular schools, including secondary schools, where programs for mildly retarded students have been located. It was important that the mildly handicapped were well assimilated into the regular school environment and that the regular school staff was fully prepared before the moderately retarded students moved into the school. However, pragmatically, such moves were necessitated by the influx of students with severe and profound handicaps into the centers which had been serving moderately handicapped students. These same pressures have acted upon centers for physically handicapped students resulting in a need to develop programs for mild and moderately involved physically disabled students in regular school programs.

The large influx of severely and profoundly handicapped students is resulting in the movement of many other handicapped students within public school services. Consequently, a central issue facing public schools involved in zero exclusion service is choosing the appropriate environment for each child. Available environments should include: 1) residential care; 2) homebound instruction; 3) therapy services; 4) self-contained schools or units; 5) self-contained integrated units; 6) resource rooms; 7) consulting teachers; 8) mainstream units. It is important to note that the term "services" has been used rather than "programs." Services, a more general term, is meant to imply that not all children are placed in classrooms. For example, many students receive outpatient therapy care. Also, a student may be placed in residential care for some period of time. Furthermore, variations within these environments are also desirable. The expansion of the traditional classroom to include community settings where skills relevant to independent living can be acquired and performed under naturally occurring conditions and restrictions would be an example.

## Procedural Base

In order to insure that a child is placed and maintained in the most appropriate services, Madison Public Schools has instituted a variety of policies and procedures which govern the service decision process. As was mentioned earlier, it is not the intent of this paper to provide a detailed description of these procedures. Written descriptions of these procedures are available by writing Madison Public Schools. However, there are two basic considerations which should be given attention here. First, how does one depersonalize the necessary advocacy system for students. Second, how does one coordinate the multiple disciplinary service model necessary for students with multiple and profound disabilities. It is the contention of this paper that these two issues are subtley related.

In regard to the first consideration we have found that the strongest form of advocacy is insistence upon a sound objective data base. Such a data base should be measuring relevant variables identified by parents and professionals as a team. The identification and measurement of these variables must be the first order of business when a student is originally referred to the system and must continue as a primary concern throughout his public school experience. As useful as a sound data base may be, unless there is a system designed to channel the information generated to persons concerned with serving the students on which the data is being kept, such data will not reach its full potential to provide an advocacy for the student.

DeSpain, Williams, and York (1975), have designed a model for continuous re-evaluation of students in various services during diagnostic and long term placements. In addition, dated records of programs with students are accumulated throughout the year and are synthesized into a year-end summary. These summaries are filed for future reference and forwarded to parents who are encouraged to keep their own files. The DeSpain, et.al., model is based upon skill sequences and is being adapted for use by all individuals involved with the students. It calls for re-evaluations at formal progress conferences with parents twice a year, at significant points in an instructional sequence, as well as specific periodic probes by an outside evaluator. Staff members are required to maintain objective behavioral data on student progress for evaluation purposes. Great flexibility in the nature of data kept is permitted, but it must be child centered. For an example of one data system used with the evaluation model, refer to Williams, Coyne, DeSpain, Johnson, Scheuerman, Stengert, Swetlik, and York (1975).

In addition to a sound data base, advocacy is a matter of attitude. For example, a parent has the legal recourse to appeal a placement decision at any time. Appeals are a form of advocacy. Advocacy and appeal are considered to be basic and inseparable parts of public school accountability. However, appeals which are handled poorly may produce an adversary relationship between the professional staff and the family. It is therefore essential that measures be taken to avoid such an unfortunate consequence. There are a variety of ways that the probability of such conflicts can be minimized. Parents, staff, and administration must be equal participants seeking the best possible services for the students. To pretend that some ideal option is always obtainable or that a perfect program or service can be prescribed in every case may only lead to greater disappointment at a later time.

The fact that public schools are virtually an educational monopoly makes it quite reasonable to expect that parents may wish to check evaluations and programs suggested by the school system against those of an independent source. The maintenance of a solid, objective data base is felt to be the best ground available from which to develop and discuss student programs. Should a family feel the need for further opinion, it is considered a natural and defensible position for them to hold.

Advocacy cannot be separated from the second basic concern, multidisciplinary service coordination. If a number of individuals across disciplines, including parents, are appropriately involved in serving a student there can be a far greater advocacy than when individuals consider themselves the only suitable advocate for the student. However, if such advocacy is to occur, the following common pitfalls of multidisciplinary programs must be avoided: 1) misunderstanding or lack of respect for the paradigms and techniques utilized by other disciplines; 2) lack of common terminology; 3) feelings of territorial rights; 4) competition for time with students; and 5) a tendency for individuals to see themselves primarily as evaluators (diagnosticians), or as implementors (programmers) rather than as parties responsible for evaluation, programming and follow through. To avoid such circumstances Madison Public Schools has developed a system of inter-disciplinary relationships founded on the following broad considerations:

1. A primary responsibility of each individual regardless of discipline is to educate others as to the function of their discipline, and to familiarize others with procedures involving students that facilitate attaining the goals of that discipline. (Equally important, is one's responsibility to cooperate in one's own education by learning from the other disciplines involved.)
2. Parents, although they may not be trained in a particular discipline, should be treated as professionals who are generalists and know a great deal about the needs of the student.
3. Equifinality applies to models of service for severely handicapped students. A variety of models, such as those that are developmentally oriented and behavior management oriented, may function simultaneously within a given program. Performance results should be the measure of appropriate programming, not one individual's opinion concerning the best approach.
4. Disciplines should be trained together to facilitate understanding and respect for each other. Staff is encouraged and reinforced for assuming trainees.
5. One to one clinical work, other than classroom instruction, and behavior management programs should be performed only when the criteria are set. These criteria should be definable and understood by other staff members. Examples might be, recovery from a post operative condition, a need to undress a student for therapy, a complex pathological speech condition, a need for very strict data taking, or uncertainty as to what procedures might be recommended to others working with a child.

## Summary

After three years of serving severely and profoundly handicapped students, Madison Public Schools has found that considerable stress is placed on public educational services unless a well-coordinated, cooperative effort is made in the delivery of services to the child. This paper has been an attempt to outline some of the concerns which have arisen and to briefly describe some of the considerations Madison Public Schools is using in developing service models. Obviously, it has been impossible to delineate the entire Madison Public Schools zero exclusion management system in this short space. Madison does not have a final, completely refined, system operating at this time. However, it is known that a foundation or basis for such a system must be steeped in student advocacy. Critical to such a foundation is: 1) the development of objective data based evaluation systems; 2) a cooperative appeal process; and 3) a multidisciplinary rather than clinical focus in programming.

It is hoped that with further self-inspection and by cooperating with, and learning from, other districts and agencies serving the severely and profoundly handicapped, Madison Public Schools will continue to develop appropriate services for severely and profoundly handicapped students.

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# COMPONENTS OF INSTRUCTIONAL PROGRAMS FOR SEVERELY HANDICAPPED STUDENTS

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Severely handicapped students (Sontag, Burke, & York, 1973) are often different from many "normal" and "mildly handicapped" students on a variety of relevant instructional dimensions (e.g., generalization, retention, imitation, articulation, acquisition, vision skills). Due to such differences the premise offered is that the teacher of these students must systematically delineate, compensate for the absence of, or directly teach skills that teachers of less handicapped students may assume are operative.

For the past several years the writers and their colleagues have been attempting to formulate and implement developmentally tenable and empirically verifiable educational services for severely handicapped students in the Madison, WI, Public School System. One of the vehicles determined of substantial educational value from both training and service perspectives is the organization of circumscribed teacher-pupil interactions into instructional programs. The term instructional program, as it is used here, refers to basic factors, variables, etc., that a teacher of severely handicapped students must consider, systematize, and/or implement in order to teach a particular skill.

Brown and York (1974) delineated a four component model of an instructional program: What to teach (content); how to teach (method); how does one assess whether or not one has taught (measurement); and the instructional materials required.

Using the four component model of an instructional program delineated above, severely handicapped students have been taught many developmentally important, practically useful, yet circumscribed skills (Brown, Bellamy, & Sontag, 1971; Brown & Sontag, 1972; Brown, Scheuerman, Cartwright, & York, 1973; Brown, Williams, & Crowner, 1974). However, as should be obvious, adherence to the four component model may be necessary, but is not sufficient to provide the best possible instructional services in that several crucial factors related to the acquisition and performance of specific skills are not taken into account. Thus, the four component instructional program has been expanded substantially and is presented below:

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## Basic Components of an Instructional Program

I. What skill does a teacher intend for the student to perform (What does a teacher intend to teach the student)?
II. Why does a teacher want the student to perform a specific skill?
III. How does a teacher intend to teach the student to perform a skill?
IV. How can a teacher empirically verify that the skill of concern is being or has been taught?
V. Can the student perform the skill at a situationally acceptable rate?
VI. What does a teacher intend to use as vehicles (instructional materials) for the skill to be acquired and performed?
VII. Can the student perform the skill across:
    a. Persons;
    b. Places;
    c. Instructional materials;
    d. Language cues?
VIII. Can the student perform a skill without directions to do so from persons in authority?

Before proceeding to a more detailed presentation of each component, several points should be noted and emphasized. First, space does not permit as detailed a presentation of each component as is possible. Second, there is no doubt that the list of components delineated above is incomplete and that additional components will evolve. Third, we are recommending that a teacher of severely handicapped students empirically verify the acceptable status of his/her students on dimensions of at least the components delineated above.

In the narrative that follows, an attempt will be made to elucidate the basic qualities of each component, justify their inclusion, show how they might be realized, and provide teachers with practical suggestions as to how the requisite skills inherent in each might be incorporated into instructional activities.

### I. What skill does a teacher intend for the student to perform?

One of the more crucial differences between teaching normal or mildly handicapped students and severely handicapped students is the degree of precision required when presenting instructional content (Brown & York, 1974). Teachers of severely handicapped students must be afforded the experiences and skills necessary to systematically disect, sequence, redisect, resequence, etc., skills under instruction. In our judgment, the conceptual and problem attack skills required and fostered by a task analysis orientation are ideally suited for teachers of severely handicapped students.

A teacher may be interested in teaching a value, an appreciation, an attitude, a skill, a concept, an understanding, a subtlety, or a feeling. Certainly, such initially nebulous objectives can be taught to severely handicapped students. However, the position offered here is that such objectives probably can be realized more efficiently if they can be operationalized in such a manner as to clearly indicate to the teacher and to the student precisely what is requested and when it should be manifested. It is a rare severely handicapped student indeed who can make large leaps through poorly organized and unspecific curriculum content. On the other hand it has been our experience that all students can acquire new skills if those skills are disected and sequenced precisely.

Task analysis essentially requires the precise delineation of skills within a particular curriculum area, the division of those skills into component parts, and the sequencing of those skills from easy to hard (simple to complex). According to Resnick, Wang and Kaplan (1974) task analysis involves:

> the develop(ment of) hierarchies of learning objectives such that mastery of objectives lower in the hierarchy (simpler tasks) facilitates learning of higher objectives (more complex tasks) ... This involves a process of task analysis in which specific behavioral components are identified and prerequisites for each of these determined (p. 680).

Perhaps the major purpose of analyzing skills inherent in a curriculum content area is to delineate an organized and precisely stated constellation of verifiable objectives from which a variety of instructional activities can be generated. A task analysis is not a statement of how a skill is to be taught but rather a statement of what is to be taught. A precise delineation of what is to be taught is an obvious prerequisite to the determination of the required materials, teaching procedures, measurement procedures, etc.

Notions as to what skills should be included in a particular content area and how such skills might be analyzed and sequenced can be obtained or abstracted from at least the following:

a. general child development literature,
b. general cognitive development literature,
c. general special education literature,
d. commercially available curriculum packages,
e. logical post-school performance demands.

It has been our experience that teachers of severely handicapped students can rarely use, without substantial adaptation, commercially available instructional content. Thus, from a training perspective, perhaps it is more appropriate to provide a teacher with skills and experiences in the area of task analysis so that in subsequent practical situations that teacher can adapt other or create new analyses to fit the developmental functioning level of his/her students.

There are at least three major reasons why teachers of severely handicapped students should be skilled in the use of basic principles of task analysis. First, a task analysis delineates starting points and terminal objectives and enhances the possibility that essential component skills will not be neglected. Second, utilization of task analysis procedures facilitates instruction that is tailored to individual functioning levels. For example, within the task analysis model mastery of various objectives can be assessed before instruction and students may only be instructed on objectives on which they failed to reach and for which they have mastered the prerequisites. In addition, students can be permitted to proceed through the sequence at their own pace, taking longer on trouble spots and skipping objectives on which they demonstrate mastery. Third, the utilization of task analysis procedures facilitates the development of more effective and efficient classroom programming. That is, a teacher can obtain data from students concerning the order in which skills are most readily acquired and skills that must be broken into smaller subskills in order to facilitate acquisition. This information can be used to continually improve instructional programs.

## II. Why does a teacher want the student to perform a specific skill?

Generally, longitudinal educational objectives for severely handicapped students should be no different than those for other students. Public schools should prepare severely handicapped students to function as independently as possible socially, vocationally, and personally in the least restricting post school environment. In our view, there is no justification for preparing students to function in large residential institutions or to foster or maintain the development of environments that unduly shelter, restrict, or retard.

Perhaps due to the limited educational opportunities in the past and the almost inevitable placement of severely handicapped citizens in large residential institutions, it might have been acceptable to teach them to "walk in line," "make pot holders," "watch Jack LaLane" without much concern for why such skills were taught. Now, however, severely handicapped students will be enrolled in public school programs for as long as 21 years. Longitudinal public education coupled with the goals of the deinstitutionalization and child advocacy movements force us to ask and justify why we should teach any specific skill. It is our current view that instruction of a skill should be justified primarily as a cumulative segment of a developmentally sound longitudinal curriculum sequence which is designed to insure independent functioning.

Well defined skill sequences across curricula domains (e.g., math, reading, language, play, self-help, independent community functioning) may be utilized to precisely delineate functioning levels within each domain. Placement of an individual along dimensions within skill sequences provides the teacher with vital information concerning the skills the individual has mastered, those that remain untaught, and in what order they might be presented. In addition, utilization of developmental skill sequences might minimize the potentially deleterious effects of changes in teachers and administrators on longitudinal programming. Obviously, a precise delineation of the current functioning level of a student on a variety of educationally important dimensions is more relevant to the development of viable instructional services than the use of such descriptions as autistic, severely retarded, trainable, psychotic, emotionally disturbed, and low MA.

Finally, while the provision of longitudinal developmental services is a goal to which we all must strive, we have an extremely long way to go before realization. There are persons around the country who have developed relatively good preschool or postschool programs, others have developed reasonable public school age programs, others have developed notable parent training activities, others have potentially valuable research projects in operation, etc. To our knowledge there is no place in which all the needed longitudinal service components are operating to such an extent that the development of large numbers of citizens over long periods of time is maximized. Certainly, we still need to develop isolated bits of information, certainly extraordinary case study achievements will continue to be inspirational; but these and other such delimited endeavors rarely provide substantial changes in the life styles of many severely handicapped citizens.

## III. How does a teacher intend to teach the student to perform a skill?

There is no doubt that teachers can formulate logically defensible longitudinal curriculum sequences and ingenious clusters of apparently relevant task analyses. However, if a teacher cannot teach students to perform the skills required by the sequences and analyses, then all is for naught. The procedures, techniques, tactics, strategies, etc. teachers use to reach new skills may be referred to as the how of instruction. Without a technology of how: what to teach is rhetoric.

Arriving at an empirically tenable system of how to teach new skills to severely handicapped students is one of the most crucial challenges confronting the educator. Particularly since delineating an appropriate how to teach is almost always confounded with varying degrees of visual, auditory, motor, attending, etc. impairments.

Precise and replicable statements as to how to teach new skills are unfortunately quite rare. What may be an effective procedure for teaching one student or one group of students may be inappropriate for another student or group. In addition, even such apparently precise techniques as those generated from the operant conditioning laboratories under the rubric of behavior modification and discrimination training are probably arts (Bricker, 1970).

Statements as to how to teach severely handicapped students have emanated from and will continue to emanate from many sources: electrical and mechanical engineering, human development, special education, psychology, teacher and parent ingenuity, the history of education, what grandmothers once did to name but a few. In an attempt to be eclectic and practical and still be relevant to the problems of severely handicapped students, we have organized information from a variety of sources into what may be referred to as basic principles of acquisition and performance. Many of the terms used to describe these principles have been taken from literature related to operant and respondent conditioning, discrimination learning, concept development and imitation learning. However, it should be emphasized that these principles, techniques, tactics, etc. must be adapted or converted for classroom use; that many schools of thought describe the same event with different words; and that the principles available for systematic utilization now are not sufficient for the educational community to provide the best possible services.[2]

## IV. How can a teacher empirically verify that the skill of concern is being, or has been, taught?

Some teachers do not even attempt to systematically assess any aspect of student progress; some teachers attempt to record every response every student makes every minute the students are in school; some teachers use one particular measurement system to the exclusion of all others. The position offered here is that teachers should have the skills necessary to implement a variety of measurement designs and techniques in such a manner as to foster a smoothly flowing instructional environment, yet in a manner that also allows the systematic recording and empirical verification of crucial aspects of student development.

There can be little doubt that direct measurement of the developmental progress of severely handicapped students is a vital aspect of any instructional system. Perhaps the following two passages are appropriate here:

> In any empirical definition of teaching, instructional measurement is crucial. With normal and mildly handicapped students, inferences about populations of skills across persons and places and materials are probably necessary and tenable. Unfortunately, inferential measurement, in our judgment, is an extremely questionable measurement orientation when applied to most severely handicapped students. The general rule that we try to follow may be stated as follows: If you determine that a particular response, skill, concept, etc., is important to the development of the student, then it is incumbent upon the teacher to directly measure the existence of the response, skill, concept, etc. of concern (Brown and York, 1974, p. 9).

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[2] A more detailed listing of basic principles of acquisition and performance and appropriate references are available upon request.

> Direct measurement is particularly crucial in attempts to teach cumulative tasks. If the correct performance of the responses in component c of a task are dependent upon the correct performance of the responses in components a and b, then the teacher must guarantee that a and b responses are in the behavioral repertoire of the student before she even considers progression to component c. Since most developmental skills are in many ways cumulative (mathematics, reading, language, speech, practical arts), teachers of trainable-level retarded students must be prepared to spend relatively long periods of time and considerable effort developing basic behavioral repertoires (Brown, 1973, p. 110-111).

It should be noted and emphasized that in addition to competencies related to how to empirically verify (measure) student progress, teachers should also be exposed to rationales regarding why and when to measure and to a variety of approaches toward measurement.

The following is a selected listing of measurement issues, terms, designs, assumptions, tactics, etc. to which our teachers in training are exposed. It should be noted that most of the designs listed below are what may be referred to as "subjects as their own controls designs." However, in addition to the listings below, teachers in training, as part of their general preparation, also receive information regarding parametric and nonparametric statistical manipulations, intergroup designs, standardized tests, etc.[3]

### Basic Principles of Instructional Measurement

1. Subjective - Objective
2. Dependent Variable
3. Independent Variable
4. Intra-group Measurement Designs
5. Inter-group Measurement Designs
6. Correlated Designs (AB Design)
7. ABAB Designs
8. Test-Teach-Test Designs
9. Multiple Baseline Designs
10. Trials to Criterion Designs
11. Direct Measurement
12. Inferential Statistics
13. Cumulative Review Designs
14. Reliability
15. Correlation
16. Criterion Referenced Tests
17. Rate of Response
18. Intensity of Response
19. Frequency of a Response
20. Latency of a Response
21. Duration of a Response
22. Errors to Criterion
23. Population
24. Continuous Measurement
25. Parameter
26. Sample
27. Statistic
28. Probe Designs

## V. Can the student perform a skill at a situationally acceptable rate?

Rate is a term which typically refers to the number of times a particular response occurs in a given time period. In an academic setting where often times a skill is a composite of different responses, the view of rate can be extended to include the number of times all critical components of a skill are performed in a given time period. There is no doubt that severely handicapped students have deficiencies in the rates at which they perform particular responses or clusters of responses. There are times when severely handicapped students manifest rates of responding that are too high. For example, a normal student might hit himself in the head once a week, a severely handicapped student might hit himself in the head five times per minute for months. A somewhat similar but different rate deficiency also manifested is the inordinate amount of time many students require to progress through a series of cumulative responses. If students have acquired a skill and performed it correctly a specified number of times, it does not necessarily indicate that the skill is mastered. In order for a skill to be considered mastered, that skill should be performed correctly at a relevant rate criterion (proficiency).

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[3] A more complete listing and appropriate references are available upon request.

There are at least three reasons for including rate of correct responding as a component of skill mastery. First, if students are to compete with and be tolerated by other individuals in the community, they will have to perform skills at community acceptable rates. For example, assume that a student has been taught to make change and then the student is asked to go to a grocery store and purchase the items on a grocery list. In a situation that actually occurred, one of our students secured the items on the list, computed the total cost of the items, and then counted out the appropriate amount of money required to pay for the goods. Unfortunately, the counting of the money required almost five minutes. Thus, a situation can exist where a student could accurately perform a given series of responses, but the time required for the performance may not be acceptable in a community setting.

Second, if a skill requires the utilization of a number of responses in sequence, a slow rate of responding may interfere with the performance of all components in the sequence by increasing the probability that the student may be unable to recall certain components. For example, assume a teacher gives a student a three component direction to follow. If the student takes twenty minutes to perform the first response, there is a good chance that she/he may not remember the cues for the last two responses.

Third, if one accepts the premise that a skill should be not only performed correctly, but performed at an acceptable rate criterion, then a question remains regarding when a rate criterion should be imposed upon skills that are cumulative. Because of a paucity of research in the application of a rate criterion in educational settings, a teacher faced with this question seems to have two major options. Assuming skills A, B and C are cumulative, a teacher may choose to require the student to: perform A at a proficient rate before moving on to B; next perform both A and B (i.e., in combination) at a proficient rate before moving on to C; and finally, perform A, B and C at a proficient rate before terminating instruction. A second option would be to require the student to perform A, B and

C correctly. Once acquired, a rate criterion would be imposed upon the combined skill (A, B and C) in order to achieve an acceptable level of proficiency.

## VI. What Does the Teacher Intend to Use as Vehicles for the Skill to be Acquired and Performed?

Tasks and task materials are vehicles through which skills are taught. Obviously, choosing tasks and task materials should not be a hastily made arbitrary decision. Teachers should carefully design and/or choose tasks and materials that reflect a consideration of the unique problems presented by the students of concern. Since one of the primary goals of teaching severely handicapped students is to verify that skills acquired in controlled instructional settings will be performed in other more practical environmental settings, many tasks should be chosen for their functional use across environments.

Functional tasks can serve the dual purposes of providing concrete examples of abstract concepts which may increase meaningfulness (Zeaman, 1973) and of teaching practical skills that students may be able to utilize daily across many environments. For example, one-to-one correspondence skills (aligning members of two sets in an arrangement which manifests a one-to-one relationship between the members) may be taught through the aligning of blocks and bears, putting straws in cups, giving each classmate a cookie, or giving each place setting a cup, plate, spoon and fork when preparing for lunch. The latter two examples teach the skill while stressing function in applied settings; the former two simply require performance of the skill. The meaningfulness and utility that functional tasks can add to the acquisition of a skill argue strongly for their use when designing instructional programs.

Not all skills can be taught exclusively through functional tasks and materials. The types of tasks needed to teach many visual discriminations to severely handicapped students highlight this point. When teaching a visual discrimination skill the task chosen should make the essential stimulus characteristics (e.g., form, color, size) easy to discern. Although this point appears simple to apply, it has ramifications which, if not considered when structuring tasks, unfortunately may lead to the development of differential responding to nonessential stimulus characteristics. For example, assume a teacher wants to teach a student to discriminate the letter "A" from the letter "B." In an attempt to make the differences between the two letters easy to discern, the teacher presents a red uppercase "A" and a blue uppercase "B." In this situation the teacher may find that the student has learned that red is called "A" and blue is called "B."

A fundamental discrimination learning rule related to selecting tasks with which to teach concepts is to choose tasks which will insure that responding is controlled only by the essential characteristics of the concept. In the letter recognition discrimination task mentioned above, this rule requires that the task should be designed so that responding is controlled by the form of the letters, not by color, size, texture or spatial position, etc. When using a functional task, control over nonessential or irrelevant characteristics is often difficult to achieve. For example, if one of the tasks used to teach letter discrimination is labelling the letters in the words "men" and "women" as they appear on the doors of public restrooms, a multiplicity of scripts, colors and placements would probably be encountered which might impede acquisition of the skill. In such situations, nonfunctional tasks which make the essential stimulus characteristics easy to discern and concommitantly reduce nonessential stimulus characteristics should probably be employed initially. Once the skill is acquired, however, essential and nonessential stimulus dimensions could then be varied or introduced.

When relating to this issue Becker, Engelmann and Thomas (1971) suggest that to insure that essential stimulus characteristics control responding, instructional tasks should be chosen which allow the teacher to:

1. teach a concept through a set of instances and not instances of the concept (e.g., examples of the letter "A" and examples that are not of the letter "A"),

2. construct instances of a concept such that they all have essential concept characteristics, and construct not instances having none or only some of the essential characteristics,

3. frequently vary nonessential characteristics of instances and not instances to insure that responding is only to essential characteristics (e.g., when teaching the letter "A", the size, color, texture and position of instances and not instances of the letter should be varied).

Implicit in the above three suggestions is the assumption that students are attending to variations in essential and nonessential characteristics of the stimuli presented. Often it is not enough to simply expect that consistent manipulation of the stimuli will be both necessary and sufficient conditions to produce the differential responses of concern. In some instances having students verbally label stimulus dimensions (nonverbal students might use gestures) and stimulus choices may facilitate differential responding to essential stimulus characteristics, and also increase retention of correct responses through the development of mediators (Butterfield, Wambold, & Belmont, 1973; Borkowski & Wanschura, 1974; Bricker, 1972; Jeffrey, 1953; Jeffrey, 1958; Chatelanat, Henderson, Robinson, & Bricker, 1971; Zeaman, 1973; Zimmerman & Rosenthal, 1974).

Other situations in which a teacher might choose to supplement functional with nonfunctional tasks might be those that require repeated practice for the acquisition of a skill, since many functional tasks typically permit only one or two response opportunities for only a few students per day. It is probably not efficient though to simply employ a task because it permits repeated practice of a particular skill in that boredom and inattention which can compete with academic progress are many times end products of stereotypic repetition.

Whether a task is functional or not, teachers should attempt to utilize tasks and materials that have reinforcement value. Choosing tasks on the basis of their reinforcement value involves selecting tasks and materials with which students will readily interact, preferably in free play situations. (A free play situation is referred to here as one where the task is available, but the student is neither prompted to engage in it nor externally reinforced for engagements.) On many occasions teaching skills through tasks with reinforcement value may involve teaching skills through toys, games, music and songs (e.g., sight words may be taught through potentially dull flashcard drills or through potentially more interesting sight word games).

If it is necessary to teach skills for which few functional tasks can be readily devised, then games, toys, music and songs which require the performance of the skills may enable the teacher to add an intrinsically reinforcing functional component while at the same time increasing the probability that maintenance through repeated practice in other environmental settings will occur after instruction. That is, games, toys, music and songs which require the performance of skills may be used to augment academic programming and as recreational activities to provide additional practice of skills in a variety of environmental settings.

Some criteria for selecting potentially reinforcing tasks are: a) tasks should be novel or offer results that are not always predictable; b) tasks should be matched to functioning levels. Tasks which are either too easy or too sophisticated are not appropriate. However, tasks just above current functioning level should hold interest and pace development; and c) tasks should allow active engagement and manifest cause and effect relationships (Piaget, 1952).

There are at least three major advantages to teaching skills through tasks with reinforcement value: 1) skills may be reinforced by allowing continued performance of the task and/or interaction with the task materials instead of relying upon teacher delineated reinforcers; 2) students are more likely to interact with the task materials and thus perform the skills taught through them outside controlled instructional situations; and 3) there should be an increased probability that students will visually and/or aurally attend to intrinsically reinforcing tasks and task materials, thus possibly eliminating the need to systematically teach attending - a necessary prerequisite to most teaching situations.

There are two additional factors which should be considered when delimiting the types and characteristics of functional tasks. First, a task that may initially appear functional may not actually be so for particular students who live in environments where there are few or no opportunities to perform related skills. Setting a table is a functional task through which one-to-one correspondence skills can be taught. However, if students live in an environment where they are not and may never be required to set a table, the task will not have functional value. Thus, teachers should attempt to insure that tasks are chosen that adequately represent the options that students have available in the environment in which they live or might live in the future. Second, tasks should be chosen on the basis of their facilitation of later skill development. This involves teaching tasks that will become components of higher level skills in a developmental sequence. Teaching students to count fingers as a rational counting task may not have much utility when rational counting is taught, but should have great utility when addition is taught.

In summary, when a teacher is considering what to use as vehicles for skills to be acquired and performed by severely handicapped students, tasks and task materials should be chosen on at least the basis of their: a) functional use to the individual student; b) ease of discrimination; c) accessibility to repeated practice; d) reinforcement value; e) facilitation of skill maintenance; f) accessibility or frequency of occurrence across settings the individual inhabits; and g) facilitation of later skill development. As it is unlikely that many tasks will fulfill all the criteria delineated, it is often necessary to teach a skill through many different tasks and materials.

### VII. Can the student perform the skill across persons, places, instructional materials and language cues?

A stimulus generalization paradigm may be used to conceptualize selected aspects of severely handicapped students' failure to perform skills acquired in one teaching environment in other environmental configurations.[4] The summarization of laboratory research studies concerned with stimulus generalization contained in Mostofsky (1965) suggests that a given response must be taught with the teaching environment in a specified state or configuration. After a response has been taught, variations in some well controlled aspect of the initial teaching environment can be introduced and the presence of the response in the new environmental configuration can be measured. Research findings related to stimulus generalization suggest that if dramatic departures from the initial teaching environment are arranged, performance in the changed environment will probably be substantially different from performance in the initial teaching environment. However, if the changed environment is only slightly different from the initial teaching environment, performance in the changed environment will probably differ slightly if at all from performance in the initial teaching environment.

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[4] As used here environmental configurations include language cues, persons, places and instructional materials.

The gradation of responding observed when the performance of a response is assessed in environmental configurations slightly or dramatically different from the configuration in which the original instruction took place is known as a generalization gradient. Sidman (1960) states that, "The generalization gradient provides a mechanism whereby behavior can adapt to an environment that never exactly repeats any combination of 'stimuli.' If a successful form of behavior were to come under the control of the precise circumstances that were present at the time it was acquired, we should have to relearn the behavior each time the original situation reoccurred with its inevitable variations (p. 207)." In the following paragraphs attempts will be made to describe how a stimulus generalization paradigm may be used to conceptualize generalization across instructional materials, extraneous stimuli and relevant cues to respond.

## Performance Across Instructional Materials

Assume that a severely handicapped student in a public school classroom has been taught to touch a ball when the teacher presents a small dark blue ball, a small dark blue cup and the verbal language cue, "Touch the ball." If the teacher then dramatically changes the task by presenting a large brown medicine ball three feet in diameter, a small dark blue cup and the language cue, "Touch the ball," it is relatively unlikely that the student will manifest better than a chance level of correct responding. However, if the teacher only slightly changes the initial instructional materials by presenting a small light blue ball, a small dark blue cup and the verbal language cue, "Touch the ball," it is likely that the student will consistently respond correctly to the new instructional material. To summarize, if dimensions of instructional materials are changed slightly, students tend to maintain responding or generalize across materials. On the other hand, if stimulus dimensions are changed dramatically, students tend to respond differentially or discriminate.

## Performance Across Extraneous Stimuli

Extraneous stimuli, as the phrase is used here, are stimuli in the environment which are not intended to control a specified response. That is, touching a ball in response to a verbal language cue should not be a function of the size of the room, the color of the teacher's hair, the chair in which a student sits or the position of the objects on the table. However, it is possible that some extraneous features of an initial teaching environment can acquire response controlling properties. If a teacher does not allow for such a possibility, she may mistakenly conject that failure to perform across environmental configurations is solely a function of, for example, the student not attending to the form cues of the ball and the cup referred to above. In fact, however, failure to perform may be a function of dramatic changes in the chair, the table, the room, the color of the teacher's hair, or the position of the objects on the table.

### Performance Across Relevant Cues to Respond

A relevant cue to respond is referred to here as a stimulus or stimulus cluster which is intended to control the response a student is to perform. In a classroom for severely handicapped students cues to respond are usually presented by a teacher or contained in instructional materials. However, such stimuli as school bells and the time on clocks also function as cues to respond.

Cues to respond typically have at least a verb component which indicates the action the student is to perform (e.g., touch, take, give, pick up) and a noun component which indicates the object of the action (e.g., touch the *ball*, pick up the *paper*). Cues to respond which have action and object components do not have to be verbal in nature: a stare by a teacher may be a cue for the student to "Sit down on a chair;" a deaf educator may use hand signals to cue a student to "Touch a ball." These cues are nonverbal but nevertheless contain action and object components. In addition, it should be noted that slight variations in the physical topography of nonverbal cues to respond may not result in differential performance. However, it is likely that dramatic variations in nonverbal cues to respond *will* result in differential performance. Concommitantly, When the cue to respond is verbal, slight variations in the way words are articulated will probably effect performance minimally, while dramatic articulation changes will probably effect performance significantly.

In a stimulus generalization paradigm a student is required to make topographically similar responses despite variations in dimensions of the instructional materials and extraneous stimulus constellations. Performance across different verbal language cues certainly may be conceptualized within the framework of a stimulus generalization paradigm. However, performance across different verbal language cues requires additional discrimination training to generate differential performance to the different verbal language cues.

More specifically, a teacher can issue a series of different verbal language cues to respond and the appropriate responses to the different language cues could be topographically *dissimilar*. For example, a teacher could present the student with a *slightly different* colored ball and cup on each trial and rotate the cues, "Give me the ball;" "Touch the ball;" "Point to the ball;" and "Take the ball." The student would have to respond in a topographically dissimilar way to each different verbal language cue in order to respond correctly. In this situation the stimulus generalization paradigm applies in that dimensions of the instructional materials were varied such that the student was required to respond to a slightly different instructional material on each presentation of the noun component of the verbal language cues. However, in order for the student to respond correctly it was also necessary for the student to discriminate the different verb components of the various response cues and differentially respond to those cues.

In addition, however, a teacher can issue a series of different verbal language cues to respond and the appropriate responses across the different language cues could be topographically similar. For example, a teacher could say, "Pick up many," or "Pick up several," or "Pick up a lot," or "Pick up a bunch," and the student could respond similarly and correctly to all the different language cues.

Obviously, certain verbal language cues may present unique problems when attempting to teach a student to perform a skill across environmental configurations because the student may be required to respond differentially to components of the cues. For instance, assume that in an initial teaching environment a teacher taught 'Tom' to touch the ball when presented with a small blue ball and a cup; a large red ball and a pillow; a small brown ball and a potato, etc. and then proudly announces to Tom's mother that he now can indicate what a ball is when given a verbal language cue. That night, Tom's mother places a small blue ball and a cup in front of Tom and says, "Give me the ball" and Tom fails to give the ball to his mother. If it can be assumed that Tom did not fail due to the changes in the instructional materials or because he responded to extraneous stimuli in the home environment, the reason for failure may be due to the change in the verbal language cues used. If the reasons Tom failed are related to the verbal language cue issued by his mother, then at least two hypotheses seem tenable: First, Tom may not have responded differentially and independently to the specific verb and noun components of the language cues in the school and home environments. That is, he may have responded to only the noun components of the language cues and therefore did not differentially respond to the different verb components. Second, Tom may have responded differentially and independently to the specific verb and noun components of the verbal language cues but did not know what action to perform to the "Give" component.

The implication for educational programming is that to teach a student to perform a skill across environmental configurations the student must be taught to appropriately respond to common variations in verbal language cues, extraneous stimuli, and task materials that frequently occur across environmental configurations.

If the success of a program is to be assessed in terms of student performance of skills across environmental configurations, then the objective for each major skill taught in a program should include student performance of skills across such selected environments. For example, the instructional objective for a one-to-one correspondence skill might be: Given the language cues "Give each _____ a _____," "Give every _____ a _____," or "Put a (_____) in each (_____)" by at least three different control figures (e.g., teacher, mother, peer) across at least three settings (e.g., classroom, playground, home) and across at least three functional tasks (e.g., setting the table, passing out cookies, dealing cards) the student should perform the skill.

Potentially, there are many instructional strategies which could be employed to insure that students master objectives. Perhaps the following strategy may be reasonably effective. If students are to perform the skills across functional tasks, then teach the skill through a combination of functional tasks and nonfunctional tasks which fulfill the task selection requirements previously delineated. For instance, teach the students one-to-one correspondence through such tasks as passing out juice cups and giving each bear a block. If the students are to perform the skills across settings, then it may be advantageous to teach the skills in several settings. For instance, teaching might occur in the gym, on the playground, in the hall, in the bathroom, and in a kitchen area using tasks appropriate to those areas. If it is necessary that students perform skills under the direction of several control figures, then several control figures may be used in instruction. If the students will likely encounter varied language cues to respond, then instruction should include cues to respond which frequently occur.

Many educators evaluate instructional program efficacy in terms of how quickly students advance through the steps of a task analysis or curriculum sequence. However, efficacy should also be assessed in terms of whether the students can perform skills across persons, places, instructional materials and language cues. Insuring that students can perform skills across environmental configurations in many instances may slow the students advancement through the steps of a curriculum sequence. To account for this educators will have to incorporate measures of both rate of advancement through a curriculum sequence and performance of skills across environmental configurations into their evaluation of program efficacy.

## VIII. Can a student perform a skill without directions to do so from persons in authority?

Individuals labeled severely handicapped are often referred to as externally controlled. That is, persons in authority usually tell them what skills to perform; how and when to perform the skills; if they perform the skills correctly or incorrectly; if they perform the skills incorrectly how to rectify the errors, etc. While responding appropriately to specific cues provided by persons in authority is the responsibility of all adults, there are situations in which performance is crucial but in which persons in authority are not present. In such situations it appears that severely handicapped students are particularly deficient and therefore quite vulnerable. One way to compensate for such a deficit is to teach specific skills, and then insure that those skills can be performed appropriately across environmental configurations without specific verbal cues being provided by persons in authority. Perhaps the following will elucidate.

There are situations in which it is appropriate for individuals to make a specific response to a specific cue provided by a person in authority (e.g., following a list of verbal directions; recording the food order of a customer in a restaurant). There is little doubt that severely handicapped students can acquire such skills and that such skills have enormous functional value. However, in these situations persons in authority are continually providing the relevant cues to respond. Obviously, such cue-response relationships are appropriate in some situations, but extremely inappropriate in others in that extraordinary dependence upon the cues of others in authority is fostered, and persons in authority are in effect determining all responses.

There are also situations in which it is appropriate for individuals to make a series of responses to only one cue provided by a person in authority (e.g., "Change the tire;" "Make the salad;" "Start working;" "Clean the tables"). Again, there is little doubt that severely handicapped students can acquire such skills and that such skills also have enormous functional value. However, here also persons in authority are providing at least the initial cues to respond and the problems delineated above may be attendant.

Undoubtedly there are thousands of situations in adulthood which require responding specifically to verbal or other cues provided by persons in authority. However, there are also situations which require that adults engage in a response or series of responses in the absence of cues to respond provided by persons in authority (e.g., when a person sees a burning sofa; when a person is alone and cuts a finger; when a person is lonely or lost; when shopping for food or clothing). If an individual responds appropriately when persons in authority are not providing specific cues to respond that individual may be construed as manifesting self-initiated performance skills. Obviously self-initiated performance skills are crucial to the independent functioning of severely handicapped students.

Finally, there are situations which require that a person engage in a series of responses, evaluate the correctness of the responses, and, if necessary, correct mistakes without being verbally cued by an authority figure. For example, if a person is confronted with a burning sofa, he/she might smother it with a throw rug, check to see if it is still smoking, and if necessary, pour water on it.

It has been our experience that many classroom activities designed for severely handicapped students have not included manipulations that allowed the students to: a) perform skills in the absence of cues provided by persons in authority; and b) evaluate and, if necessary, correct errors.

Thus, we are suggesting here that teachers determine if it is appropriate for a particular skill to be performed without specific cues to do so provided by persons in authority. If so, teachers should arrange for such performance. In addition, if it is appropriate that a student perform a series of responses, evaluate the responses, and if necessary, correct errors, then teachers should also arrange for such performance.

In the recent past the writers and their colleagues have made attempts to teach severely handicapped students the skills necessary to initiate responses or a series of responses, to evaluate the correctness of the responses made, and if necessary, to correct errors with few if any cues provided by persons in authority. Such skills are referred to here as self-regulation skills. Nietupski and Williams (1974) conceived of rudimentary self-regulation skills as consisting of at least four basic steps:

1. Detecting or defining the task.
2. Arriving at alternative ways to complete the task ←
3. Implementing an alternative.
4. Assessing the outcome of the alternative
    - if the task is not correctly completed. →
    - if task correctly completed, end of task.

In the Nietupski and Williams (1974) paradigm students may fail to self-regulate responding because: a) they do not self-initiate steps in the self-regulation strategy; b) they fail to detect or define the task; c) they fail to arrive at an appropriate way to complete the task; d) they fail to implement an appropriate alternative; or e) they fail to evaluate the outcome correctly.

It is suggested here that self-regulation may be incorporated into a curriculum for severely handicapped students as follows: When a skill is taught, if practical, the students should be required to initiate all components of the self-regulation strategy to complete tasks related to that skill without verbal cueing from persons in authority. For example, if students are acquiring skills related to cooking, they should be required to initiate the preparation of their own meals without verbal cueing from authority figures. Stated another way, whenever a new skill is taught the students should be required to complete tasks related to the skill, generate alternative ways of completing the task, implement an alternative, and check the appropriateness of the alternative implemented. Self-regulation strategies should not be taught as segmented or isolated curriculum entities but as integral parts of all activities in which students participate.

Hopefully, if educators in conjunction with parents and other concerned persons can teach students to perform situationally appropriate skills without specific direction to do so, we will more closely approximate the longitudinal objective of independent adult functioning.

## Summary

Several basic components of instructional programs for severely handicapped students were delineated and described. Obviously, each component is in need of further elaboration and refinement and methods of incorporating them into longitudinal curriculum sequences must be operationalized. The possibility exists that adherence to all components when attempting to teach all skills might be impractical and irrelevant. However, it has been our unfortunate experience to observe students fail because we did not systematically consider and accommodate to relevant instructional variables. Perhaps if teachers absorb at least the components delineated into their educational services, the general skill repertoires of the students in their charge will be enhanced substantially.

In addition, it should be noted and emphasized that there is no doubt that the version of an instructional program offered here will evolve into a different form in the future. Some components will probably be rejected, some will be expanded, and others will be added. Hopefully, what happens to this version will be a function of increased awareness of the students we are attempting to serve.

Finally, teaching technologies and other information related to the provision of the best possible educational services to severely handicapped students are in the initial stages of development. On the other hand, educators throughout the nation are being asked, ordered, or voluntarily striving to provide educational services to such students. When such an information/service gap exists, frustrations and failures are inevitable. Hopefully, through the collective efforts of many persons from many orientations and disciplines we will be able to demonstrate in the near future that comprehensive, longitudinal, and quality educational services can be generated and those services will result in substantial developmental changes in the functioning levels and ultimate life styles of citizens who at least for the moment, are referred to as severely handicapped.[5]

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[5] The reader interested in securing information concerning the materials, references, curriculum sequences, etc. referred to in this paper is encouraged to write Dr. Lou Brown, 427 Education Building, University of Wisconsin, Madison, Wisconsin 53706. Some materials will be sent free of charge. If there is a charge, the reader will be referred to the appropriate vendor.

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# PROCEDURES OF TASK ANALYSIS AS RELATED TO DEVELOPING INSTRUCTIONAL PROGRAMS FOR THE SEVERELY HANDICAPPED

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## Introduction

Severely handicapped students do not readily learn from casual and unplanned exposure to instructional materials. How can instructional programs which will maximize the learning of severely handicapped students be created? One way to maximize the learning of severely handicapped students is to delineate skill sequences which lead from students' current functioning levels to the mastery of selected behavioral objectives. For instance, a skill sequence for teaching a student to independently unbutton a shirt could be:

1. Student should unbutton a special shirt with oversized buttons and buttonholes when the buttons are three fourths through the buttonholes.
2. Student should unbutton a special shirt with oversized buttons and buttonholes when the buttons are one half through the buttonholes.
3. Student should independently unbutton a special shirt with oversized buttons and buttonholes.
4. Student should unbutton a regular shirt when the buttons are one half through buttonholes.
5. Student should independently unbutton a regular shirt.

A rudimentary skill sequence for teaching a student to express and comprehend verb-noun phrases could be:

1. Nouns - Objects
    - a. Functional Object Use: Student should demonstrate the socially appropriate use of objects (e.g., drink from cup, eat with spoon, wash with washcloth).
    - b. Receptive: When presented a cue such as "Touch/show me/point to/take" the student should touch/find/point to/take the specified object from an array of objects.

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c. Expressive: When presented a cue such as, "What is this?" (teacher points to an object) the student should indicate (e.g., label, sign, point to the object's name on a communication board) the name of the object.

2. Verbs - Actions
   a. Receptive: When presented a cue such as, "Show me how you _____," or "How do you _____?" the student should perform the appropriate action.
   b. Expressive:
      i. Label action - self: When presented a cue such as, "What are you doing?" the student should label his/her action.
      ii. Label action - others: When presented a cue such as "What is _____ doing?" the student should label the action.

3. Verbs - Nouns (active verb, noun object)
   a. Receptive: Presented with a cue such as "Show me how you push (verb) wagon (noun)" the student should choose the correct object from an array and perform the correct action.
   b. Expressive:
      i. Label actions - self: When presented a cue such as, "What are you doing?" the student should say, "Push (verb) wagon (noun)."
      ii. Label action - others: When presented a cue such as, "What is _____ doing?" the student should say, "Push (verb) wagon (noun)."

In our judgment task analysis is essential to the development of efficient skill sequences. Task analysis is a process of determining what to teach in what sequence to insure student mastery of an objective. The product is a skill sequence. That is, the product is a precise delineation of a behavioral objective, the objective's component skills and an appropriate sequencing (easy to hard) of the component skills. The sequence of component skills should lead from responses in the student's repertoire to mastery of the objective. The product of task analysis is not a statement of how to teach a skill but rather a statement of what is to be taught. A precise delineation of what is to be taught is an obvious prerequisite to determining how to teach target skills. Articulation of a skill sequence is also a requisite to assessing students' skill levels. That is, a skill sequence delineates what skills should be assessed.

## Task Analysis: Steps to Completion

The first step in performing a task analysis is to define an appropriate behavioral objective and search instructionally relevant resources for component skills, sequences and instructional programs related to the objective. Once a behavioral objective has been specified and relevant resources reviewed, the objective should be divided into steps or component skills which lead from responses in the students' repertoires to mastery of the objective. Next unnecessary and redundant component skills should be eliminated. Finally, prerequisite skills should be determined. That is:

1. state the behavioral objective and review instructionally relevant resources;
2. derive and sequence the component skills of the objective;
3. eliminate unnecessary component skills;
4. eliminate redundant component skills;
5. determine prerequisite skills.

These steps will be described in detail in later sections of this paper.

It must be emphasized that we do not expect you to be proficient at task analysis after only reading this chapter. To become proficient at performing task analysis use the basic five step process delineated here to task analyze an instructional objective. Then submit the skill sequence which results from the task analysis to your colleagues for their constructive criticism. On the basis of the criticism revise the skill sequence and resubmit it for further constructive criticism. Continue this process until you and your colleagues are satisfied with the skill sequence. The critical thinking skills essential to task analysis can only be learned through performing task analyses and subjecting their resulting skill sequences to constructive criticism.

## Why a Teacher Should be Skilled at Task Analysis

Notions as to what the component skills of an objective are and how such skills might be analyzed and sequenced can be obtained or abstracted from at least the following:

a. general child development literature;
b. general cognitive development literature;
c. general special education literature;
d. commercially available curriculum packages;
e. logical post-school performance demands.

With all the information on how to sequence skills available, why is there a need to perform task analysis? When we task analyze an objective, aren't we just reinventing the wheel? If, in the course of reviewing instructionally relevant resources, you find a skill sequence or commercially available instructional program which precisely fits your students' functioning levels and needs, use it. We have been developing instructional programs for the severely handicapped for the past seven years. Unfortunately, it has been our experience that teachers of severely handicapped students can rarely, without substantial adaptation, use commercially available or normal child development skill sequences. Thus, from a training perspective it is essential to provide teachers with skills and experiences in task analysis so that in practical situations they can adapt available skill sequences or create new sequences to fit the developmental functioning level and needs of their students.

There are at least four reasons teachers of severely handicapped students should be skilled in the use of task analysis.

First, task analyses generate skill sequences. These sequences delineate starting points, terminal objectives and enhance the possibility that essential component skills will not be neglected. If task analysis is used to derive long term skill sequences (sequences the completion of which will encompass a period of years), the long term skill sequences should minimize the potentially deterious effects of changes in teachers and administrators on longitudinal instructional programming.

Second, task analysis and the resulting skill sequences facilitate instruction that is tailored to individual functioning levels. That is, within the skill sequence model mastery of component skills of an objective can be assessed before instruction and students need only be instructed on skills they lack and for which they have mastered the prerequisite skills. In addition, students can be permitted to proceed through the skill sequence at their own pace, taking longer on trouble spots and skipping component skills on which they demonstrate mastery.

Third, well defined skill sequences across skill areas (e.g., self-help, language, play, social) may be used to precisely delineate student functioning levels within each skill area. A precise delineation of students' current functioning levels on a variety of skill sequences is more relevant to the development of viable instructional services than the use of such descriptions as autistic, severely retarded, trainable, psychotic, emotionally disturbed, and low MA.

Fourth, use of task analysis and the resulting sequences facilitates the development of more efficient classroom programming. That is, a teacher can systematically monitor student progress through a sequence and obtain data concerning whether the component skills of an objective were appropriately broken down and ordered. This information can be used to continually improve the efficiency of skill sequences and classroom programming.

## Determining Behavioral Objectives

A preliminary step to task analysis is determining appropriate behavioral objectives for the students. Through assessing the students' performance in previous programs, informal evaluations and formal evaluations the students' skill levels should be determined in such areas as self-help, motor, communication and social. There are several assessment systems available which are geared to the severely and profoundly retarded. For example, the TARC assessment system for severely handicapped children provides a short form assessment of the self-help, motor, communication and social skills of the severely and profoundly retarded. After determining the students' skill levels, the communication, motor, self-help and social skills the students need to function in their immediate and future environments (e.g., group homes, vocational settings, recreational settings) should be determined. On the basis of the students' current skill levels and potential skill needs behavioral objectives should be stated for each student.

Behavioral objectives are statements of what skills students should learn to perform under what conditions. The first step in establishing a behavioral objective is to describe what observable and measurable skills the students should perform when they have mastered the objective. Observable and measurable skills have definite beginnings and endings. That is, objectives should include verbs (skills) such as point, write, name, list, pick up, match, etc. not verbs such as appreciate, understand, realize, be aware of or comprehend. In some instances we should be concerned with what students understand, believe, feel, know or appreciate. An objective could be teaching students to understand specified noun concepts such as cup. However, we can only make inferences concerning students' knowledge, understanding or appreciation by assessing the overt and measurable behaviors the students perform. That is, we can only make statements about students' understanding of a noun concept such as cup by stating what behaviors the students perform in relation to cups. A behavioral objective could be teaching students to label specified noun concepts: that is, in the presence of specified objects (e.g., cups) and given the cue, "What is this?" the students should say "cup."

The second step in establishing a behavioral objective is specifying under what conditions, "givens," the students are to perform the skills. Precise statements of "givens" are necessary if we are to agree on which students have mastered an objective. What if four students presented various cups and given the cue, "What is this?" can only correctly label white coffee cups. On the other hand, two different students can correctly label a variety of cups which differ in size and color. Would you and I necessarily agree on which students mastered the objective? A better objective would be: presented specified objects (blue, white, big or little cups) and the cue, "What is this?" the students should say "cup."

Even after precisely specifying the "givens" you and I might not agree on which students have mastered an objective. What if four students correctly label 85% of the cups. However, two different students correctly label 90% of the cups. Have all the students learned the concept of cup? We failed to state in our objective the level of performance desired. For objectives to be useful they must state desired performance levels.

An objective can be defined and refined until it becomes absurdly long and detailed. However, it is only necessary to write objectives in enough detail that outside observers can determine and agree with you on which students have mastered objectives. That is, objectives should: 1) specify the overt and measurable skills students should perform; 2) identify the conditions under which the skill is to occur; and 3) define the criterion of acceptable performance.

It must be noted that objectives do not determine teaching style. Think about how you would teach a student to master each of these objectives.

1. When seated at a classroom worktable with the teacher, presented a blue, white, big or little cup and given the cue, "What is this?" the student should say "cup."

2. When seated at lunch with the teacher, presented a blue, white, big or little cup and given the cue, "Tell me what this is," the student should say "cup."

Both objectives state what skills students will learn to perform under what conditions. However, for either objective students could be taught to perform the skills under the specified conditions through play activities, highly structured drills, group instruction, individual instruction, and so on.

## Applying the Five Steps of Task Analysis

When a behavioral objective has been specified, the next step in the program design is to identify a sequence of component skills which leads from responses in students' repertoires to performance of the objective. Task analysis begins with any behavioral objective and continues until all the component skills students have to be able to perform to master an objective have been specified and sequenced from easy to hard. The component skills may be identified through asking the question, "To master this objective what necessary component skills must the students be able to perform?" For each component skill identified the same question may be asked until further component skills cannot be identified. This process could be continued indefinitely. In practice a task analysis usually stops when the new component skills identified are ones already mastered by the students.

The task analysis process will first be illustrated through a task analysis of labeling noun concepts. Then an analysis of a self-care, vocational and motor skill will be presented. The noun concept example will use the concept of cup. However, the task analysis should be valid for any noun concept (e.g., spoon, ball, book). As described above a task analysis can usually be accomplished in five steps:

1. state the behavioral objective and review instructionally relevant resources;
2. derive and sequence the component skills of the objective;
3. eliminate unnecessary component skills;
4. eliminate redundant component skills;
5. determine prerequisite skills.

## Labeling Noun Concepts: Cups

1. The objective is to teach labeling of noun concepts. That is, presented specified objects (blue, white, big or little cups) and the cue, "What is this?" the student should say "cup." Generally, the more information about the skill area brought to the task analysis the better the task analysis. Use references such as curriculum guides, textbooks, commercially available materials, references on normal child development, other teachers' task analyses and learn what component skills other people have delineated and how they sequence them.

Review how to task analyze concepts through reading such sources as, "Teaching: A Course in Applied Psychology" by Becker, Engelmann and Thomas (1969). Look at such commercially available materials as Distar Language and Peabody Language Kits to determine how they analyze and teach concepts. Then review developmental literature on concept development, such as Piaget (1970), to determine what component skills children typically master before learning to label noun concepts. If a commercially available instructional program or developmental skill sequence which precisely fits your students' needs is found, use it. If a program or skill sequence which fits your students' needs is not available, perform a task analysis to adapt available sequences or create new sequences.

Obviously, your ability to research a skill area before performing a task analysis depends on the availability of references, your ability to directly select relevant references without first sorting through reams of nebulous literature and the amount of research time available. (You will typically want to implement a program tomorrow not wait two months until you have thoroughly researched it.) You and your school should develop a professional library of relevant resource material. Instructional Material Centers (IMCs) and Area Resource Centers (ARCs) are good resources. One of the best sources of information are the task analyses of other teachers. We suggest that you develop a procedure for sharing relevant task analyses with other teachers in your system. To get you started at the end of this paper we have listed selected references we hope will help you derive task analyses for specific skill areas.

2. When you have completed the essential reference work, you are ready to derive the necessary component skills of the target behavioral objective. The component skills are derived through three processes: 1) listing the component skills suggested by commercial materials and relevant developmental literature; 2) as described earlier asking the question, "To master this objective what component skills must the student be able to perform?" This question is asked until further component skills cannot be derived; and 3) performing the skills required by the objective yourself, watching others perform the skills and imagining yourself performing the skills while noting the necessary component skills and their order of occurrence. Our objective was to teach labeling of noun concepts such as cup.

Figure 1 displays a lattice of a skill sequence which could be generated through such a task analysis.[2]

If the students are to learn to label cups, they should be able to discriminate between cups and noncups. Thus, they should be able to discriminate visual cues. Discriminating visual cues is our first component skill (Prerequisite Skills, Box 1). Blind students can use other sense modalities (e.g., tactile) to discriminate between cups and noncups (Prerequisite Skills, Box 2). Literature on child development indicates that children functionally use objects (that is, they know what to do with the objects such as drink from a cup, eat with a spoon) before they learn to associate names (labels) with objects. Another component skill is functional object use (Prerequisite Skills, Box 3). (Note: Functional object use can be broken into further component skills.) Furthermore, children can usually match an object to an identical object before they can associate a label with an object. Another component skill could be when presented a cup students should be able to find (match) an identical cup from an array of one cup and several noncups (Phase I, Box 1). Many instructional materials teach matching through having the students draw lines between like objects. The students should be able to match a cup to another cup through drawing lines between them.

Students should know that cups can be different sizes, shapes and colors and still be cups. We must translate the notion of knowing into a behavioral objective. Students should be able to match a cup to a similar cup (nonexact match) from an array of objects (Phase II, Box 1).

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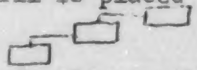
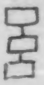
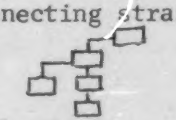
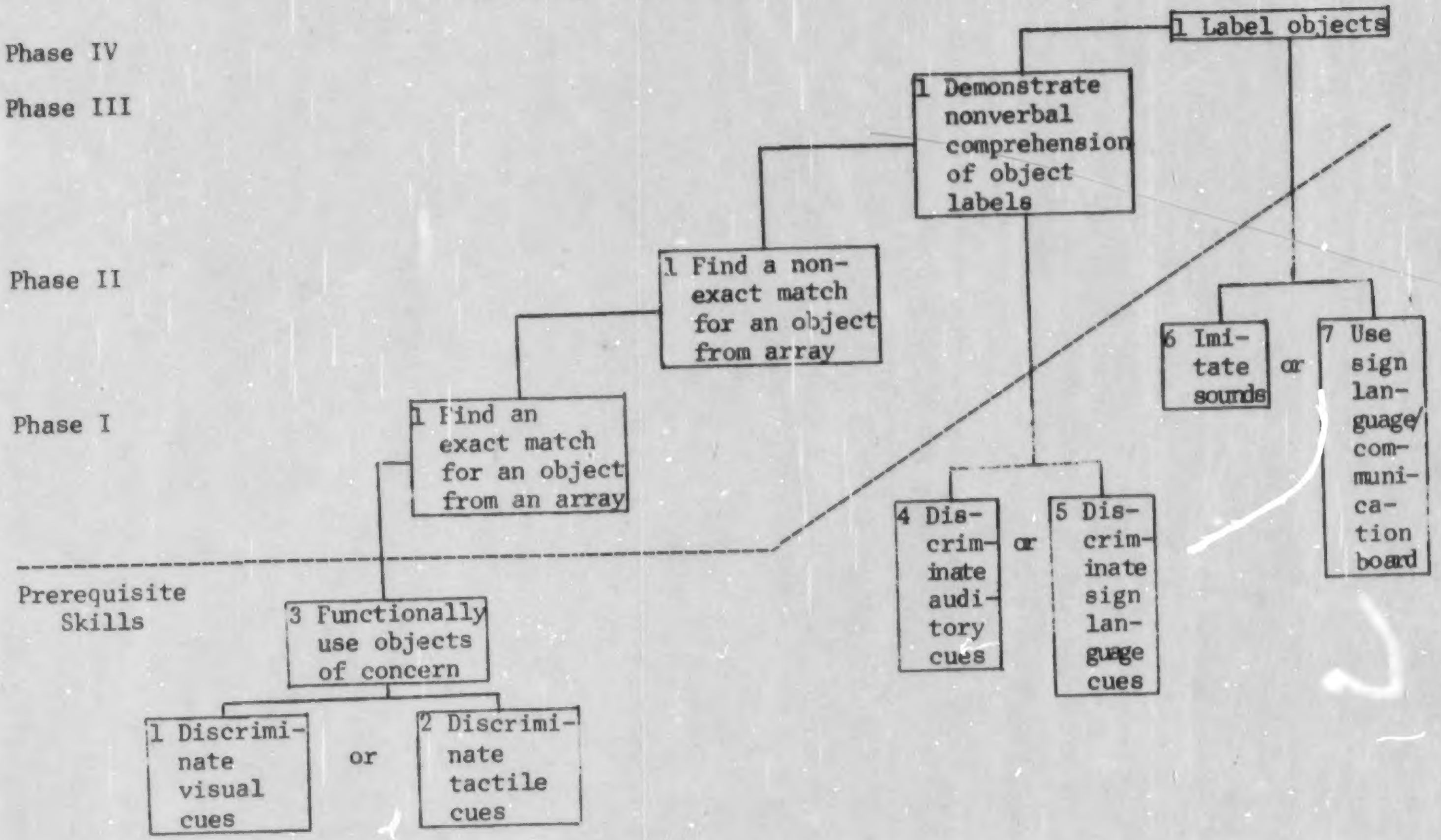
[2] In a lattice a step format is used. That is, the first component skill of a skill sequence is placed in the lower left hand corner and each sequential component skill is placed in boxes connected by a line with a 90 degree angle.  This lattice format indicates that a lower skill may facilitate the acquisition of higher skills but mastery of the lower skill is not necessary before the student can begin to learn higher skills. The terminal objective is always placed in the upper right hand box and each component skill hangs from that box. Be sure to sequence the component skills from easiest (far left box) to hardest (far right box). If a skill must be learned before another skill, hang the boxes directly underneath one another with a connecting straight line. 

a possible lattice - 

See Smith, D. D., Smith, J. O., and Haring, N. G. The Modified Lattice System: An Approach to the Analysis and Sequence of Instruction and Objectives, Experimental Education Unit, Child Development and Mental Retardation Center, University of Washington, for details on constructing lattices.

Figure 1
Labeling Noun Concepts Lattice


Phase IV
Phase III
Phase II
Phase I
Prerequisite Skills
1 Label objects
1 Demonstrate nonverbal comprehension of object labels
1 Find a non-exact match for an object from array
1 Find an exact match for an object from an array
3 Functionally use objects of concern
1 Discriminate visual cues
or
2 Discriminate tactile cues
4 Discriminate auditory cues
or
5 Discriminate sign language cues
6 Imitate sounds
or
7 Use sign language/communication board

Nonverbal comprehension of object labels is another component skill (Phase III, Box 1). That is, children can usually identify objects before they can name them. For example, when given the cues such as "touch cup" or "point to cup," children can identify which object is a cup before they can label objects when given a cue such as "What is this?" For students to demonstrate nonverbal comprehension of object labels they should be able to discriminate auditory cues (Prerequisite Skills, Box 4). Deaf children may demonstrate nonverbal comprehension of the sign language symbol for cup (Prerequisite Skills, Box 5).

If students are going to learn to name (label) objects, they should be able to imitate sounds (Prerequisite Skills, Box 6) (Note: Imitation can be broken into many component skills.) Nonverbal students may use sign language or communication boards to label objects (Prerequisite Skills, Box 7).

Finally, students who can imitate sounds or use sign language/communication boards, functionally use objects, discriminate objects (match), and demonstrate nonverbal comprehension of the object labels should be ready to learn to label objects (Phase IV, Box 1).

This simplified task analysis suggests that the objective has at least the following component skills:

a. can discriminate visual or tactile cues;
b. can discriminate auditory cues or sign language cues;
c. can functionally use the objects of concern;
d. given an object can find (match) an identical object from an array of objects;
e. given an object can match a similar object (nonexact match) from an array of objects;
f. match identical objects by drawing lines between objects;
g. demonstrate nonverbal comprehension of object labels;
h. imitate sounds or use sign language/communication boards.

3. A key word in deriving necessary component skills for an objective is necessary. Many common classroom activities are closely related to valid objectives and it is easy to mistake these related activities for activities necessary for learning to perform the skills required by an objective. For example, the skill indicating objects which are identical by drawing a line between them is a related skill not a necessary one. Because this skill is not necessary to the learning of skills required by the objective we will eliminate it. However, because an activity is not included in our task analysis does not mean that it is not instructionally relevant. Many related activities or skills, such as drawing lines between objects, may facilitate skill generalization or transfer. That is, they require students to use a skill across related tasks.

4. Eliminate redundant or equivalent component skills.

5. When only the necessary component skills have been established entry or prerequisite skills should be delineated. The determination

of which component skills are prerequisite skills is arbitrary. Generally, we don't intend to teach students everything (e.g., functional object use, discriminating visual cues, imitation of sounds) within one instructional program, such as a noun concept program. Functional object use could be taught as part of a self-help or play program and imitation as part of an imitation program. Thus, some component skills can be designated as prerequisite skills. In this case we will designate discriminating visual cues, discriminating tactile cues, discriminating auditory cues, discriminating sign language cues, functional object use, imitating sounds and use sign language/ communication board, as prerequisite skills.

The skill sequences or hierarchies generated through the process of task analysis may be represented in the form of either vertical skill listings or lattices. There are advantages to both the list format and the lattice format. The list format allows a more precise specification of givens or conditions while the lattice format more clearly portrays an overview of all the component skills of the sequence and their interrelationships. Figure 1 displayed the skill sequence in a lattice format. Figure 2 displays the skill sequence in a vertical list format.

The noun concept task analysis illustrated the basic process of task analysis. To illustrate the utility of task analysis across curriculum areas an example task analysis in the areas of self-care skills (taking pants off), vocational skills (packaging fish bait), and motor skills (sitting) will be presented.

Self-Care Skill: Taking Pants Off (Adapted from Meyers, Sinco and Stalma, 1973)

1. A self-care behavioral objective could be teaching students to independently take their pants off; that is, when students in a standing position in stocking feet wearing pants with an elastic waistband are given the cue "(Name), take off your pants," the students should put their hands on the waistband of their pants in a grasping manner (four fingers on outside, thumb on inside), bend and push the pants down to their ankles. Next the students should sit down, bend at the waist and grasp the pants which are around their ankles. Then the students should lift one foot straight up and pull the first pant leg off. Finally, the students should lift their second foot straight up and pull their second pant leg off.

When the objective has been defined, go to curriculum guides, textbooks, commercially available materials, references on normal child development, other teacher's task analyses and learn what component skills other people have identified and how they sequence them. For analyses of dressing skills we suggest such sources as, "Self-help Instruction, Systematic Instruction for Retarded Children: The Illinois Program, Part III," Linford, Hipsher, and Sililovitz (1972) and "Behavior Modification: New Ways to Teach New Skills," Panyan (1972), "The Right to Education: A Curriculum for the Severely and Profoundly Retarded," Meyers, Sinco and Stalma (1973). If a

## Figure 2

Objective - to teach labeling of noun concepts: Presented selected objects (blue, white, big or little cups) and the cue, "What is this?" the student should say "cup."

Criterion - the student should label the cups correctly nine out of ten times they are presented a cup and the cue "What is this?"

Prerequisite skills: The student should be able to:
1. discriminate visual or tactile cues;
2. functionally use the objects (drink from a cup);
3. discriminate auditory or sign language cues;
4. imitate sounds or use sign language/communication board.

Phase I: Given a blue, white, big or little cup and the cue, "Show me cup," the student should find (touch, point to, pick up) its exact match from an array of three objects (one cup and two noncups).

Part 1: The student should find the match for the blue cup.

Part 2: The student should find the match for the white cup.

Part 3: The student should find the match for the big cup.

Part 4: The student should find the match for the little cup.

Phase II: Given a blue, white, big or little cup and the cue, "Show me cup," the student should find (touch, point to, pick up) a cup (not an exact match) from an array of three objects (one cup and two noncups).

Part 1: The student should find a match for the blue cup.

Part 2: The student should find a match for the white cup.

Part 3: The student should find a match for the big cup.

Part 4: The student should find a match for the little cup.

Phase III: Given an array of three objects, one cup (blue, white, big or little) and two noncups and the cue, "Show me cup." the student should find (touch, point to, pick up) the cup.

Part 1: The student should find the blue cup.

Part 2: The student should find the white cup.

Part 3: The student should find the big cup.

Part 4: The student should find the little cup.

Figure 2 cont.

Phase IV: Presented a blue, white, big or little cup and the cue, "What is this?" the student should say "cup," make the sign for cup or point to cup on a communication board.

Part 1: The student should label the blue cup.

Part 2: The student should label the white cup.

Part 3: The student should label the big cup.

Part 4: The student should label the little cup.

commercially available instructional program precisely fits your students' needs, use it. If a program which fits the students' needs is not available, perform a task analysis to adapt available sequences or create new sequences.

2. When the essential reference work is complete, derive the necessary component skills of the behavioral objective. As previously described, the component skills are derived through three processes: 1) listing the component skills suggested by relevant references; 2) asking the question "To master this objective what component skills must the student be able to perform?" until further component skills cannot be derived; and 3) performing the skills required by the objective yourself, observing others performing the skills, and imagining yourself performing the skills while noting the necessary component skills and the order of their occurrence. Such analysis might lead to the sequence displayed in the lattice of Figure 3.

If students are to take their pants off their feet, they should be able to direct their leg and foot movements (Prerequisite Skills, Boxes 1 and 2). If students are to pull their pants down and off their feet, they should also be able to direct their arm and hand movements and grasp (pincher grasp) to guide the pants (Prerequisite Skills, Boxes 3, 4 and 5). Furthermore, if students are to remove their pants starting from a standing position, they should be able to stand without support, maintain balance while standing (compensate for movements to the right or left, forward or backward), and maintain balance while bending from a standing position, bend and touch their ankles (Prerequisite Skills, Boxes 6, 7, 8 and 9). In addition, if students are to pull their pant legs off from a sitting position, they should be able to sit without support, maintain balance while sitting and bending, and independently move from a standing to sitting position (Prerequisite Skills, Boxes 10, 11 and 12).

For students to take their pants off from a standing position they must: first, grasp the waistband of their pants (four fingers on the outside, thumb on the inside) and push the pants down from their hips to their knees (Step V, Box 1); second, while standing and bending push the pants down from their knees to their ankles (Step IV, Box 1); third, sit down and bend over (Step III, Box 1); fourth, lift one leg straight up and take the pants off their first foot (Step II, Box 1) and fifth, place their first foot back on the floor, lift their second leg directly up and pull the pants off their second foot (Step I, Box 1).

You probably noticed that there is an apparent mistake in the lattice. That is, in the lattice the first component skill the students have to perform (pushing down pants from hips to knees) is the last step (Step V) and the last component skill the students have to perform (taking pants completely off) is the first step (Step I). The lattice is correct. When teaching the component skills of many objectives, especially self-help, self-care, and vocational objectives, the last skill students have to perform is often taught first.

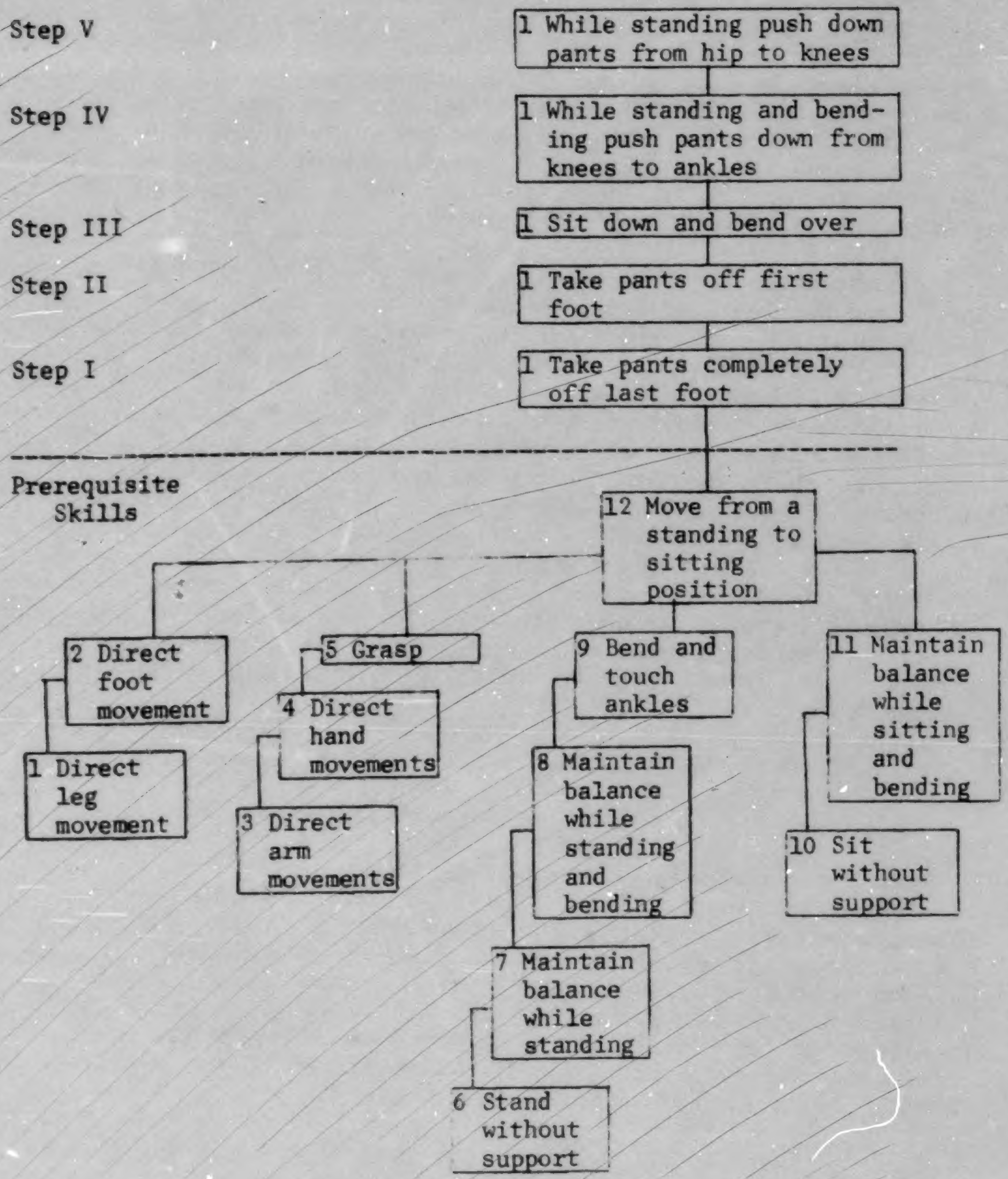


Figure 3
Taking Pants Off Lattice

Step V
1 While standing push down pants from hip to knees
Step IV
1 While standing and bending push pants down from knees to ankles
Step III
1 Sit down and bend over
Step II
1 Take pants off first foot
Step I
1 Take pants completely off last foot
Prerequisite Skills
12 Move from a standing to sitting position
2 Direct foot movement
1 Direct leg movement
5 Grasp
4 Direct hand movements
3 Direct arm movements
9 Bend and touch ankles
8 Maintain balance while standing and bending
7 Maintain balance while standing
6 Stand without support
11 Maintain balance while sitting and bending
10 Sit without support

Teaching the last skill to be performed first may not appear to make sense. However, imagine you are teaching students to eat independently with a spoon. The first skill students must perform is filling a spoon, the second is moving the spoon from plate to mouth, and the last is inserting the spoon in their mouth. Let's say you teach the first skill of the sequence first. Now the students have their spoons filled but they cannot get the spoon to their mouth. Thus, they do not enjoy the natural reward of placing a full spoonful of food in their mouth. You would have to reward (with a toy, praise) the students for filling their spoon and then physically help them move the spoon to their mouth and insert it.

On the other hand, what if you taught inserting the spoon first? The reward for learning to independently insert the spoon would be the food. This is a naturally occurring reward that should ultimately maintain the students' self-feeding. Next, you could teach the students to independently move their spoon from their plate to their mouth. Then you could teach the students to fill their spoon. Finally, you could teach the students to independently fill their spoon, move their spoon to their mouth and then insert the spoon. In this case teaching the last component skill of the sequence of skills first is advantageous. That is, students are always rewarded with food for correct performance of the final skill in the sequence. Similarly, it is efficient to teach the last component skill of many objectives first. For such objectives the task analysis process involves first delineating which component skills students must perform first, second, etc. but teaching the component skills in reverse order.

3. Eliminate unnecessary component skills.

4. Eliminate redundant or equivalent component skills.

5. Determine which component skills are prerequisite skills. Such skills as directing leg movements, directing foot movements, directing arm movements, directing hand movements, grasp, standing without support, maintaining balance while standing, maintaining balance while standing and bending, sitting without support, maintaining balance while sitting and bending, and moving from a standing to sitting position could be taught through a motor skills program concurrent with or prior to the dressing program. These skills are arbitrarily delineated as prerequisite skills.

Figure four depicts the skill sequence in a vertical list format.

Vocational Skill: Packaging Fish Bait (Adapted from Brown, Bellamy, and Sontag, 1971)

1. A vocational skill behavior objective could be teaching the students to package fish bait; that is, given fish hooks, bait, and a glass jar the students should insert fish hooks into bait, pile four completed strips of bait into a pile, fold all four strips (together) into thirds, and place the folded bait into a glass jar.

## Figure 4

Objective - Teaching students to independently take off their pants: that is, when students in a standing position in socking feet wearing pants with an elastic waistband are given the cue "(Name), take off your pants," the students should put their hands on the waistband of their pants in a grasping manner (four fingers on outside, thumb on inside), bend and push the pants down to their ankles. Next, the students should sit down, bend at the waist and grasp the pants which are around their ankles. Then the students should lift one foot straight up and pull the first pant leg off. Finally, they should lift their second foot straight up and pull the second pants leg off.

Criterion: The students should pull their pants down nine out of ten times they are given the directive "(Name), take off your pants."

Prerequisite Skills:

- Directs leg movement
- Directs foot movement
- Directs arm movement
- Directs hand movement
- Grasp
- Stand without support
- Maintain balance while standing
- Bend and touch ankles
- Maintain balance while standing and bending
- Sit without support
- Maintain balance while sitting and bending
- Move from a standing to sitting position

Step I: Teaching students to take pants completely off last foot.

Step II: Teaching students to take pants off first foot.

Step III: Teaching students to sit down and bend over.

Step IV: Teaching students while standing and bending to push their pants down from knees to ankles.

Step V: Teaching students while standing to push their pants down from hips to knees.

When the objective has been delineated, go to curriculum guides, textbooks, commercially available materials, and other teachers task analyses and learn how other people have task analyzed vocational tasks. For analyses of vocational tasks go to such resources as "Training the Mentally Retarded in the Production of Complex Production: A Demonstration of Work Potential," Barloff and Tate, 1967; "A Technique for Programming Sheltered Workshop Environments for Training Workers," Crossin (1969); "The Learning of Difficult Visual Discriminations by the Moderately and Severely Retarded," Gold and Barclay (1973).

2. When the essential reference work is complete, derive the necessary component skills of the behavioral objective. The component skills may be derived through: 1) asking the question "To master this objective what component skills must the student be able to perform?" until further component skills cannot be derived; and 2) performing the skills required by the objective yourself, observing others performing the skills, imagining yourself performing the skills and noting the order of their occurrence. Figure 5 displays the completed task analysis in a lattice.

If the students are to package bait, they should be able to direct arm movements, direct hand movements and use pincer grasp (Prerequisite Skills, Boxes 1, 2 and 3). The remainder of the task analysis is a description of what skills the students should perform in what sequence to complete the task. These skills include: place pieces of bait on table with tail on left (Step I, Box 1);[3] pick up bait with one hand (Step II, Box I); pick up fish hook with other hand (Step III, Box 1); put fish hook into hole on right side (head side) of bait (Step IV, Box 1); pull fish hook through hole on left side (tail) of bait (Step V, Box 1); pull hook tightly into bait (Step VI, Box 1); place bait with hook on table (Step VII, Box 1); flatten hook against bait (Step VIII, Box 1); complete 3 more pieces of bait (Step IX, Box 1); place all four pieces of bait into pile (Step X, Box 1); pick up all four completed pieces of bait together (Step XI, Box 1); fold 1/3 of bait (tail side) under (Step XII, Box 1); Fold 1/3 of bait (head side) under (Step XIII, Box 1); and place completed bait into glass jar with hook pointing up (Step XIV, Box 1).

3. Eliminate unnecessary component skills.

4. Eliminate redundant or equivalent component skills.

5. Determine which component skills are prerequisite skills. Such skills as directing arm movements, directing hand movements and pincer grasp could be taught through a motor skill program. These skills are arbitrarily delineated as prerequisite skills. Figure 6 displays the skill sequence in a vertical skill list format.

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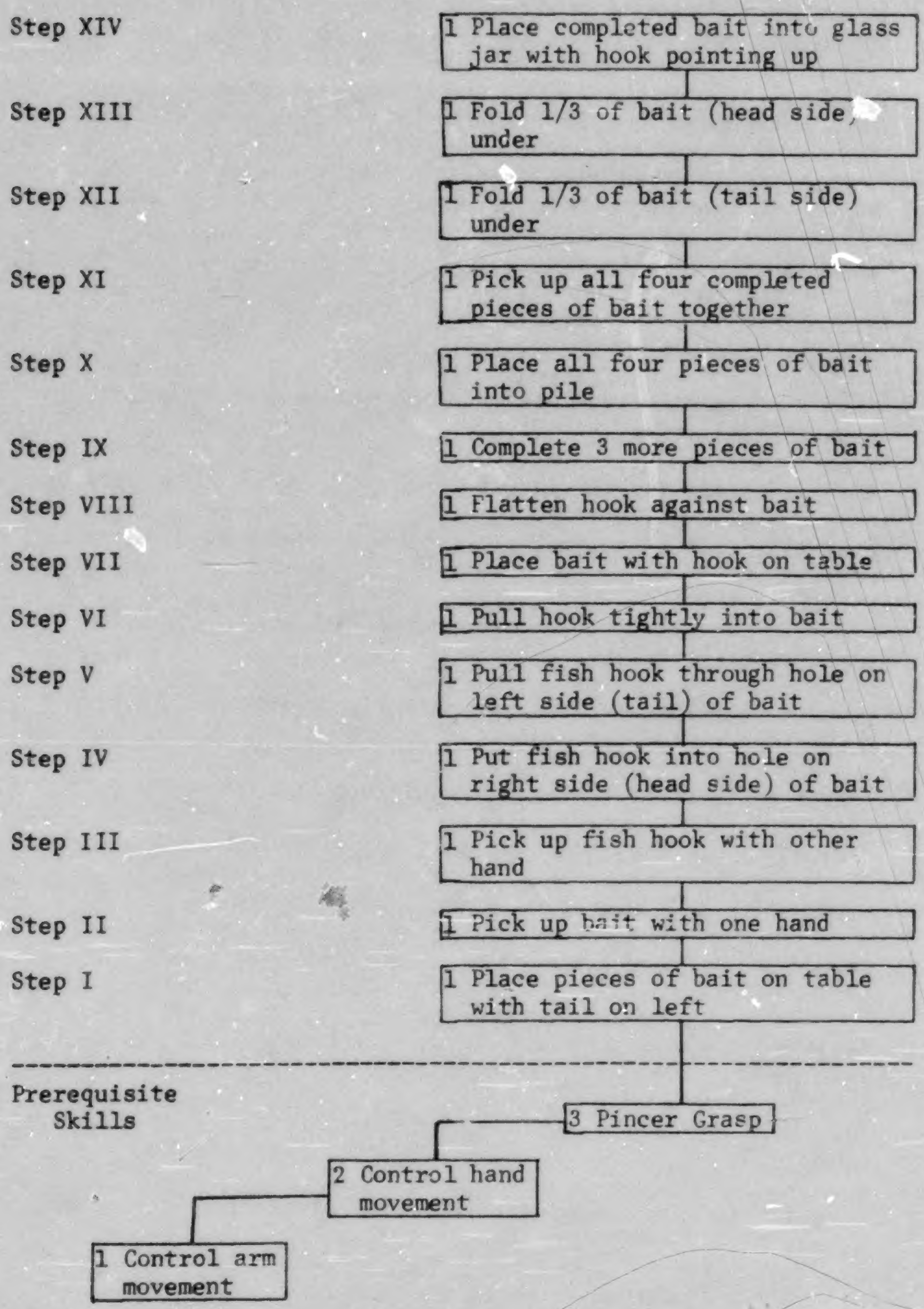
[3] A jig or prosthetic device may be used with students who cannot differentiate left from right, head side, tail side, 1/3 of a quantity, a quantity of 3, up, down, etc.

Figure 5
Packaging Fish Bait Lattice


Step XIV
1 Place completed bait into glass jar with hook pointing up
Step XIII
1 Fold 1/3 of bait (head side) under
Step XII
1 Fold 1/3 of bait (tail side) under
Step XI
1 Pick up all four completed pieces of bait together
Step X
1 Place all four pieces of bait into pile
Step IX
1 Complete 3 more pieces of bait
Step VIII
1 Flatten hook against bait
Step VII
1 Place bait with hook on table
Step VI
1 Pull hook tightly into bait
Step V
1 Pull fish hook through hole on left side (tail) of bait
Step IV
1 Put fish hook into hole on right side (head side) of bait
Step III
1 Pick up fish hook with other hand
Step II
1 Pick up bait with one hand
Step I
1 Place pieces of bait on table with tail on left
Prerequisite Skills
3 Pincer Grasp
2 Control hand movement
1 Control arm movement

## Figure 6

Objective - Teaching students to package fish bait: that is, given fish hooks, bait and a glass jar the students should insert fish hooks into bait, pile four completed strings of bait into a pile, fold all four strings (together) into thirds and place the folded bait into a glass jar.

Criterion: The students should correctly assemble 19 out of 20 complete products in an hour.

Prerequisite Skills:

- Direct arm movements
- Direct hand movements
- Pincer grasp

Step I: Teaching students to place pieces of bait on table with tail on left.

Step II: Teaching students to pick up bait with one hand.

Step III: Teaching students to pick up fish hook with other hand.

Step IV: Teaching students to put fish hook into hole on right side (head side) of bait.

Step V: Teaching students to pull fish hook through hole on left side (tail) of bait.

Step VI: Teaching students to pull hook tightly into bait.

Step VII: Teaching students to place bait with hook on table.

Step VIII: Teaching students to flatten hook against bait.

Step IX: Teaching students to complete 3 more pieces of bait.

Step X: Teaching students to place all four pieces of bait into pile.

Step XI: Teaching students to pick up all four completed pieces of bait.

Step XII: Teaching students to fold 1/3 of bait (tail side) under.

Step XIII: Teaching students to fold 1/3 of bait (head side) under.

Step XIV: Teaching students to place completed bait into glass jar with hook pointing up.

## Motor Skill: Sitting

1. A motor skills objective could be teaching the students to sit without support; that is, when placed in a sitting position on the floor with legs apart and knees bent the students should be able to sit two minutes without support.

When developing and implementing motor skills programs, it is essential to consult occupational and/or physical therapists. Occupational and physical therapists can assess the students' motor skill needs and suggest programs and training procedures. They can help delineate developmentally sound skill sequences which are appropriate to individual students special motor problems (e.g., cerebral palsy). For information on motor skill development review such references as, "The Baby Exercise Book," Levey (1973); "Handling the Young Cerebral Palsied Child at Home," Finnie (1970); and "The Neuromuscular Maturation of the Human Infant," McGaw (1945). If a developmental skill sequence or commercially available instructional program which precisely fits the students' needs is found, use it. If such a program or skill sequence is not readily available, perform a task analysis to adapt available sequences or create new sequences.

2. When the essential reference work is complete, derive the necessary component skills of the behavioral objective. As described above the component skills of the objective are derived through three processes: 1) listing the component skills suggested by relevant references; 2) asking the question "To master this objective what component skills must the student be able to perform?" until further component skills cannot be derived; and 3) performing the skills required by the objective yourself, observing others perform the skills and imagining yourself performing the skills while noting the necessary component skills and the order of their occurrence. Figure 7 displays a skill sequence for sitting depicted in a lattice.

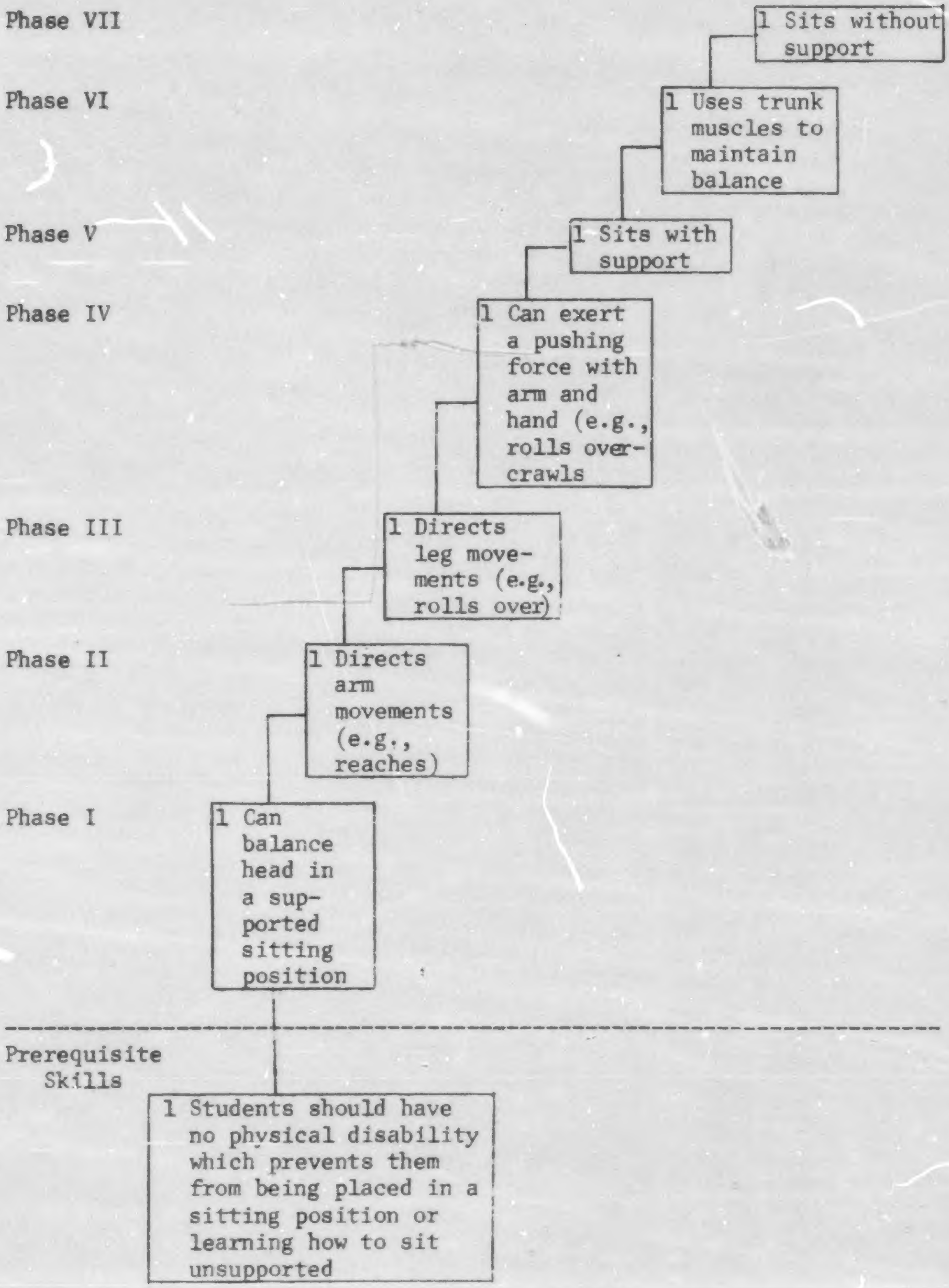
If the students are to sit unsupported, they should be able to control their heads; that is, balance (compensate for left to right and back and forth movements) their heads while sitting (Phase I, Box 1). For the students to maintain their balance while sitting they should be able to direct their arm movements (e.g., reach) direct their leg movements (e.g., roll over) exert force on their arm and hand (e.g., roll over - crawl) sit with support and use trunk muscles to maintain balance (compensate for left to right and back and forth movements) (Phases II, III, IV, V, VI). Students who have these skills should be ready to learn to sit unsupported (Phase VII).

3. Eliminate unnecessary component skills.

4. Redundant or equivalent component skills should be eliminated.

5. Determine which component skills are prerequisite. In this case the only prerequisite for students entering the program is that

Figure 7
Sitting Lattice


Phase VII
1 Sits without support
Phase VI
1 Uses trunk muscles to maintain balance
Phase V
1 Sits with support
Phase IV
1 Can exert a pushing force with arm and hand (e.g., rolls over-crawls
Phase III
1 Directs leg movements (e.g., rolls over)
Phase II
1 Directs arm movements (e.g., reaches)
Phase I
1 Can balance head in a supported sitting position
Prerequisite Skills
1 Students should have no physical disability which prevents them from being placed in a sitting position or learning how to sit unsupported

the students have no physical disabilities which prevent them from being placed in a sitting position or learning how to sit unsupported.

Figure 8 displays the skill sequence in a vertical list format.

## Validation of Task Analyses and Skills Sequences

Precise skill sequences derived through task analyses are more likely to be successful than casual or unplanned task presentation sequences. It must be emphasized that increasingly finer breakdowns of objectives, addition of overlooked component skills and the elimination of unnecessary component skills are constant processes involved in task analyses. That is, you should progress from skill sequences constructed through logical (armchair) analysis of an objective to skill sequences constructed through systematic observations of student progression through sequences. This process involves a progression from a logical task analysis to an empirical task analysis.

Validation of skill sequences requires instructing students while carefully recording each student's performance. This is a time consuming but productive task which often results in the reordering of component skills and the delineation of component skills that had not been identified but which should be included in the skill sequence. Construction of skill sequences through a task analysis approach is a dynamic process in which it is likely that any given skill sequence will be modified based upon student performance.

The cycle of task analyze an objective, instruct and monitor student performance, reanalyze the objective, instruct and monitor student performance and so on, is essential to the development of efficient skill sequences. It is only through such research that we can effectively progress from "normal" developmental sequences, logically derived notions of skill sequences, and psychological laboratory research to valid instructional curricula.

## Applying Task Analysis in the Classroom

### Long-Term Skill Sequences or Extended Task Analyses

It has been possible to empirically verify that severely handicapped individuals can be taught a wide range of arbitrarily selected skills. Through the systematic use of such procedures as positive reinforcement, physical guidance and modeling such skills as walking (e.g., O'Brien, Azrin and Bugle, 1972), following selected verbal directions (e.g., Whitman, Azkaras and Chardos, 1971), selected social skills (e.g., Whitman, Mercurio and Caponigri, 1970), toileting (e.g., Azrin and Fox, 1971) and receptive vocabulary, imitation, naming and sentence production (e.g., Bricker and Bricker, 1970) have been taught severely handicapped individuals.

## Figure 8

Objective - Teaching students to sit without support: that is, when placed in a sitting position on the floor with legs apart and knees bent, the students should be able to sit unsupported.

Criterion: The students should be able to sit unsupported for two minutes.

Prerequisite Skills: Students should have no physical disability which prevents them from being placed in a sitting position or learning how to sit unsupported.

Phase I: Teaching students head control while in a supported sitting position.

Phase II: Teaching students arm control (e.g., reaching).

Phase III: Teaching students leg control (e.g., rolling over).

Phase IV: Teaching students to exert pushing force with arm and hand (e.g., rolling over - crawling).

Phase V: Teaching students to sit with support.

Phase VI: Teaching students to use trunk muscles to maintain balance.

Phase VII: Teaching students to sit without support.

Unfortunately, most documented reports of programs that have been effective in teaching severely handicapped individuals have been concerned with segmented perceptual-motor, self-care, and language skills. That is, the programs do not explicitly delineate that a skill is a segment of a sequence and how the skill is related to other component skills of the sequence. In the past due to limited educational opportunities, almost inevitable placement of severely handicapped citizens in large residential institutions and lack of an effective instructional technology it was perhaps somewhat acceptable to teach severely handicapped citizens segmented skills. Now, however, severely handicapped students will be enrolled in public school programs for as long as 21 years. Longitudinal public education coupled with more effective instructional technology make it possible for us to delineate long term skill sequences (sequences the completion of which will encompass a student's school age years). Furthermore, the goals of deinstitutionalization and child advocacy make it mandatory that instruction of a skill be justified as a cumulative segment of a longitudinal skill sequence designed to lead students from their current level of functioning towards independent community functioning.

It must be stressed that any time a task analysis is performed portions of long-term skill sequences are delineated. For instance, the task analysis of noun concepts delineated a sequence which started with functional object use, progressed through matching objects to similar objects and terminated with labeling noun concepts. If we had started with a higher level objective, such as providing students with the skills necessary to succeed in college, the task analysis would have been more extended and would have delineated a more extensive skill sequence. Thus, the extent of a skill sequence derived through a task analysis depends on the behavior objectives delineated and the extent to which we delineate all the component skills and sequence them.

## Entering Skills - Readiness

Task analyses identify prerequisite (readiness) component skills and depict the hierarchial relationships among the component skills of a behavioral objective. On the basis of task analysis, skill sequences can be delineated which insure that all prerequisite component skills are learned before instruction on any higher order component skill is begun.

Readiness in a task analysis model consists of mastery of the component skills which facilitate the student learning more advanced skills. Within this model a teacher does not simply wait for a student to be "ready" to learn a skill but teaches the requisite component skills. If we had complete skill sequences in all skill areas, we could delineate and teach the readiness skills for any area.

## Instruction

A task analysis and the resulting skill sequence is derived to provide an organized set of learning objectives around which instructional programs of many types may be organized. A skills sequence is not a statement of how a task is to be taught or assessed but is a prerequisite to the delineation of specific instructional and measurement procedures.

A skill sequence provides the teacher with a basic notion of how to order task presentations and in what order students learn skills. However, it must be emphasized that students learn more than one skill at a time. They do not necessarily first learn skill A, then learn skill B, then learn skill C. It is more likely that while they are learning skill A they are also starting to learn skills B and C and adjunct skills X and Y. The implication for instruction is if evaluation indicates that the students should be taught skill A, instruction should be concentrated on skill A. However, if feasible skills B and C and adjunct skills X and Y should also be introduced. For example, based upon a skill sequence your first instructional objective could be to teach students to match a cup to another cup and your second objective could be to teach students to label cups. However, while you are concentrating on teaching students to match cups to other cups you should introduce labeling cups and the adjunct information that if cups are dropped, they break; and if cups are tipped, liquid spills. In other words, skill sequences delineate key skills and in what order they should be presented but do not limit instruction to only one key skill or the skills delineated.

Use of task analysis and the resulting skill sequences facilitates the individualization of instruction. That is, tests or observational procedures can be designed for each component skill in a sequence. Then students' mastery of various component skills can be assessed before instruction, and they need only be instructed on component skills they lack and for which they have mastered the prerequisites. Grouping of students for instruction can be done on the basis of skills students have mastered and skills they should be taught next. That is, students to be instructed on the same component skill of a skill sequence can be grouped. A precise delineation of the current functioning level of a student on a variety of educationally important dimensions is more relevant to the development of viable instructional services than the use of such descriptions as autistic, severely retarded, trainable, psychotic, emotionally disturbed, and low MA.

The underlying assumption of a skill sequence is that most students learn skills in the same order. However, a skills sequence should be adapted to individual student needs (e.g., motor handicaps, blindness, deafness, muteness). A sequence may be adapted to individual students through: 1) adapting instructional procedures, 2) adapting response requirements, and 3) adapting instructional tasks.

### 1. Adapting Instructional Procedures

Many instructional procedures and models may be used to teach the same skill. That is, a skill may be taught through participation of all students in highly structured drills, individual instruction, a free school model, a nursery school model, and so on. Procedures and models which are most effective with individual students should be used. However, whatever instructional procedures and models are used the teacher can use skill sequences to monitor student progress.

2. Adapting Response Requirements

Students can demonstrate mastery of a skill or "concept" through a variety of responses. For example, students can demonstrate mastery of the "concept" ball through nonverbal responses (e.g., throwing balls, touching balls, kicking balls, signing, communication boards) and/or verbal responses (e.g., labeling balls, making statements concerning balls). A skill sequence should be adapted to students with specific motor and expressive language problems through allowing students to learn and demonstrate skill mastery through responses they are capable of performing.

3. Adapting Instructional Tasks

A skill may be taught through many tasks. For example, students can learn one-to-one correspondence through such tasks as giving each place setting a spoon while setting the table, giving each classmate a piece of candy, and so on. A skill should be considered mastered only after students can functionally use the skill to operate on their everyday environment and can perform the skill across people, settings, language cues, and tasks which frequently occur. To facilitate skill mastery the tasks selected to teach a skill through should be chosen on the basis of their: a) functional use to the individual student; b) accessability or frequency of occurrence in the environment of the individual student; c) potential reinforcement value to the individual student; d) facilitation of discrimination learning; e) applicability to repeated practice; f) facilitation of later skill development; and g) facilitation of skill maintenance.

It is unlikely that one task which fulfills all the criteria delineated may be devised. However, use of these three basic tasks should fulfill the task selection criterion: a) functional tasks; b) games; and c) repeated practice tasks.

a. Functional tasks: Selecting tasks on the basis of functional use involves teaching skills through functional tasks students frequently encounter. For example, the operation of sorting glasses and silverware can be taught through teaching students to sort glasses and silverware into separate sets at the classroom worktable or sorting glasses and silverware into separate sets while putting away the dishes after lunch. Obviously, sorting while putting away dishes is the more functional task.

b. Games: Tasks which facilitate the maintenance and generalization of skills should be selected. Generally, maintenance of skills can be insured through students' repeated practice or use of the skills. Teaching skills through tasks which frequently occur in environments the students inhabit should enhance skill maintenance. Skill maintenance may also be enhanced through devising games or fun activities (e.g., songs, play) which require that students use particular skills. Such games and fun activities should be made a regular component of students' daily programs and free time activities. In addition, games and fun activities have potential reinforcement value to students and thus students are more likely to engage in the activities and use the skills outside of the instructional setting.

c. Repeated Practice Tasks: A problem with some functional tasks and games is that they only provide infrequent response opportunities (practice) and do not facilitate discrimination learning. Selecting tasks with continued applicability to repeated practice involves choosing tasks which facilitate discrimination learning and through which the student can be presented many opportunities to respond. This task selection criterion is based on the notion that carefully structured tasks and frequent opportunities to respond typically results in more efficient learning then unstructured tasks and infrequent response opportunities. In some cases repeated practice tasks may have to be used in conjunction with functional tasks and games.

To implement classroom instruction based on a task analysis approach teachers should first delineate ten to fifteen behavioral objectives relevant to the development of their students. Next, each behavioral objective should be task analyzed and skill sequences generated. Then, students should be tested and placed (grouped) along relevant dimensions of the skill sequences. After initial groupings are determined regroupings should be made on the basis of the students' rate of progression through the skill sequence. That is, students should be permitted to proceed through a skill sequence at their pace, taking longer on trouble spots and skipping component skills on which they demonstrate mastery. A formal skill sequence and statements of behavioral objectives can actually permit a greater degree of individualization and flexibility than is possible with other approaches to curriculum development.

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# EVALUATION OF THE SEVERELY RETARDED AND MULTIPLY-HANDICAPPED: AN ALTERNATIVE

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## I. Rationale for the general model of assessment and evaluation

The traditional model for the assessment and evaluation of exceptional individuals has concentrated upon two factors: intelligence and adaptive behavior. That is, the traditional model has evaluated exceptional individuals' performance on IQ tests and selected community living skills. Intelligence has most often been inferred by the use of such tests as the Stanford-Binet, Wechsler or Cattell. For the most severely and profoundly retarded, the standardized administration of intelligence tests is unlikely to yield valid results. Thus, when assessing these individuals the evaluator is usually advised to use "clinical judgement."

The IQ score derived from intelligence tests is simply a way of comparing any single individual's performance on such tests with the "typical" performance of individuals his own age. That is, individual performance is compared to a "norm." Such norm-referenced tests are not likely to delineate the kind of specific skill strengths and weaknesses needed to develop an instructional program appropriate to the individual.

Adaptive behavior is usually assessed by using scales such as the Adaptive Behavior Scales of the American Association on Mental Deficiency or the Vineland Social Maturity Scale. These scales attempt to determine the adequacy of an individual's behavior in such community living skill areas as self-care, social, vocational, economic, and communication. However, "other sources of information regarding a person's everyday behavior" (Grossman, 1973, p. 16) may also be acceptable for determining an individual's level of adaptive behavior. For example, reports from a vocational supervisor and/or a landlord might fall into this category of "other sources."

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The most prominent example of this model of evaluation is that developed by the American Association on Mental Deficiency (AAMD) and described in their Manual on Terminology and Classification in Mental Retardation (Grossman, 1973). The format and recommendations contained within this manual are predicated upon a medical model of retardation. In such a model, retardation is considered to be "the manifestation of some underlying disease process or medical condition" (page 8). In practice, this traditional model has been used primarily to group individuals into categories of mild, moderate, severe, and profound retardation. That is, the evaluation data is collected primarily to serve the purpose of determining the incidence, prevalence and characteristics of retardation. In addition, the classification system is purported to make communication among practitioners and researchers more precise and to facilitate research, administration and program planning for the retarded. Several writers have questioned this traditional approach to assessing and classifying the retarded. Among these are Berkowitz (1974), Claus (1972), Filler, Bricker, Bricker, Robinson, Smith, and Vincent-Smith (1975), and Hobbs (1975).

Berkowitz (1974) makes the point that the evaluation and classification process for retarded populations has become so tedious as to be considered by some an end in itself. He encourages those who are charged with such assessments to use evaluations for developing strategies, innovations, and techniques which will make changes in the identified population.

Claus (1972) emphasizes that there should be a close alignment between specific curriculum goals and the items used in assessment instruments. He recommends the dropping of IQ ("norm-referenced") tests in favor of "criterion-referenced" tests. The use of "criterion-referenced" tests, simply means that individuals are assessed in terms of some standard or criterion level of performance. Criterion referenced tests are usually attached to detailed sequences of educational objectives or performance goals. The sequence of goals serves as a checklist for making the assessment. For example, a criterion based language assessment could entail assessing individuals on skills such as: demonstrating receptive comprehension of objects, demonstrating receptive comprehension of verbs, labeling objects, and labeling verbs. Individuals' competencies are determined by their individual performance on each component of the sequence of language skills, not in relation to a "norm" or "typical" performance. Within the criterion referenced assessment model, evaluation is directly linked to instructional goals. This results in the type of assessment advocated by Claus: "the systematic recording of the behaviors and behavior changes shown by a person which are considered desirable in relation to previously stated performance goals" (p. 44).

Filler, et. al. (1975) point out that we have no business evaluating and labeling children unless the evaluation and resulting labels benefit them in some way. They emphasize that evaluation procedures are useless unless they specify some kind of educational treatment. It is not that evaluating individuals for the purpose of classifying (labeling) them is inherently evil, but that the "evil" lies in our insistence upon the validity of these classifications and our failure to recognize that they constitute little more than convenient groupings. They warn further that the differences among individuals are often great, even when all have been classified as severely retarded. Thus the meanings of labels such as mild, moderate, severe, and profound as descriptors of the retarded are imprecise.

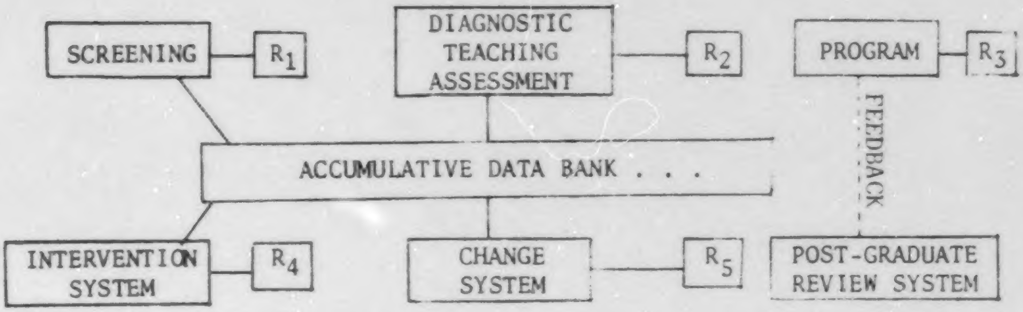
Hobbs (1975) recognizes the intelligence test as a "remarkably efficient instrument" (p. 46) capable of taking a standardized sample of a person's behavior quickly, but suggests that the routine use of such tests in the public schools is inappropriate. He concludes that it would be better to let the "performance (of the individual) itself be the basis of classification, should classification in fact be required" (p. 48).

The model presented in the remainder of the paper attempts to delineate an assessment and evaluation system that answers the criticisms of the traditional model. The proposed model is based upon criterion-referenced testing. That is, the crux of the evaluative effort lies in the availability of well-defined, logically ordered programs whose skill sequences may be used in assessment. Thus, the model ultimately requires the delineation of skill sequences in all important areas of human development (motor, social, language, etc.) from zero skills to competent functioning. The model places a heavy responsibility upon both: (1) those who provide instruction programs for individuals; and (2) those who are involved in initial assessment and placement, periodic evaluation, and intermittent intervention. In a kind of utopian sense, the model suggests that a best-of-all-possible-worlds for students would incorporate total flexibility. That is, the students could be at different points in sequences of self-care skills, language skills and play skills while moving at their own pace in each. In this way, students can be grouped on the basis of their place in each skill sequence (performance) instead of the label assigned them. Such a model attempts to incorporate Berkowitz's (1974) emphasis on developing strategies for facilitating optimum learning in handicapped students, Claus's (1972) demand for relating assessment to programming, and the plea of Filler and his colleagues (1975) that we attend to individual differences in students.

## II. Overview of the model

The General Model for Assessment and Evaluation portrayed in Figure 1 consists of three phases of assessment up to and including programming for students, and three systems for follow-up once student programming has begun. The three parts of assessment are: 1) screening, 2) diagnostic teaching, 3) program; and the three systems for follow-up are: 1) intervention, 2) change and 3) post-graduate review.

Figure 1
The General Model for Evaluation[2]


SCREENING
$R_1$
DIAGNOSTIC TEACHING ASSESSMENT
$R_2$
PROGRAM
$R_3$
FEEDBACK
ACCUMULATIVE DATA BANK . . .
INTERVENTION SYSTEM
$R_4$
CHANGE SYSTEM
$R_5$
POST-GRADUATE REVIEW SYSTEM

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[2] The R following each phase of assessment and each system indicates that there are planned review points where accumulated data will be studied and objectives reviewed so as to keep student programming fresh, correct and dynamic.

## The three phases of assessment

1. Screening assessment: This assessment evaluates all data concerning students accumulated prior to school placement. It assesses information from family, physicians, school programs, or residential care centers as well as any additional information gathered through social workers, teachers, psychologists, occupational therapists, speech therapists, and physical therapists. Data obtained from the screening assessment is used to determine an appropriate diagnostic classroom placement for students. (See Figure 2)

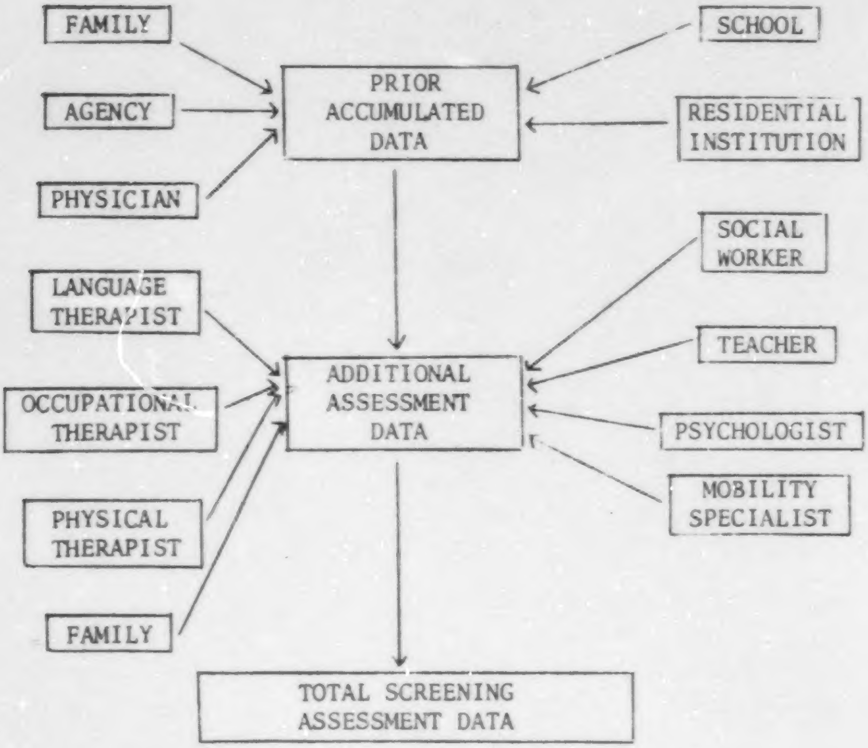
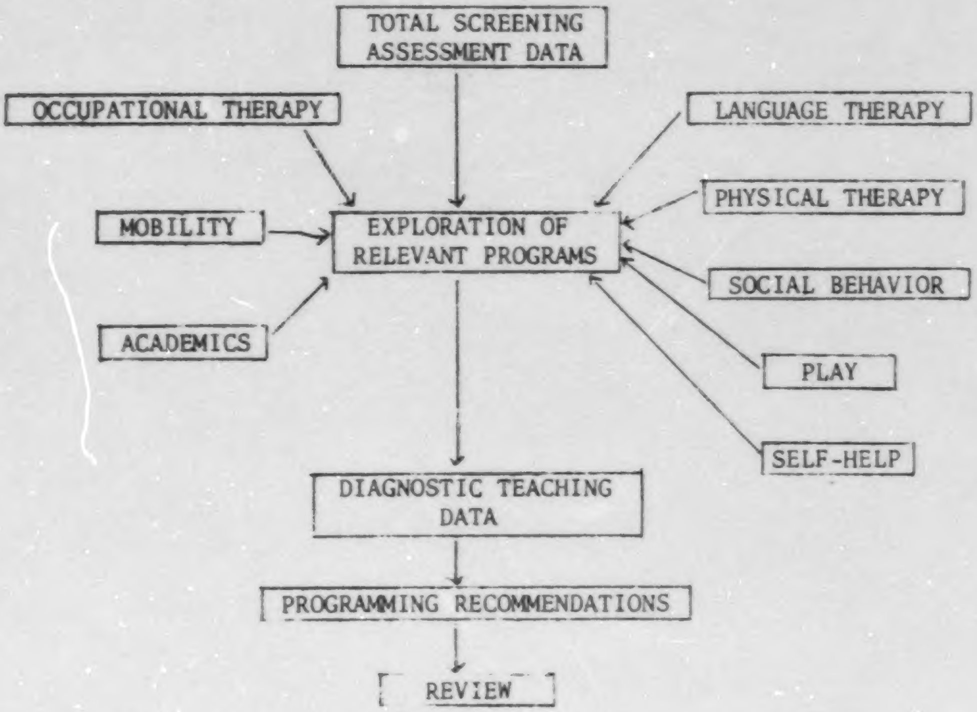


Figure 2
Screening Assessment

FAMILY
AGENCY
PHYSICIAN
SCHOOL
RESIDENTIAL INSTITUTION
PRIOR ACCUMULATED DATA
SOCIAL WORKER
LANGUAGE THERAPIST
TEACHER
OCCUPATIONAL THERAPIST
ADDITIONAL ASSESSMENT DATA
PSYCHOLOGIST
MOBILITY SPECIALIST
PHYSICAL THERAPIST
FAMILY
TOTAL SCREENING ASSESSMENT DATA

2. Diagnostic teaching assessment: After screening students are placed in an appropriate classroom for diagnostic assessment. During diagnostic assessment performance data is obtained to determine the initial skill levels of the students and their educational needs. Such information is then used in deciding which personnel (e.g., special class teachers, resource room teachers, physical therapists, language therapists) and what "pertinent" classroom placements are appropriate to the students' educational program. (See Figure 3)

Figure 3
Diagnostic Teaching Assessment

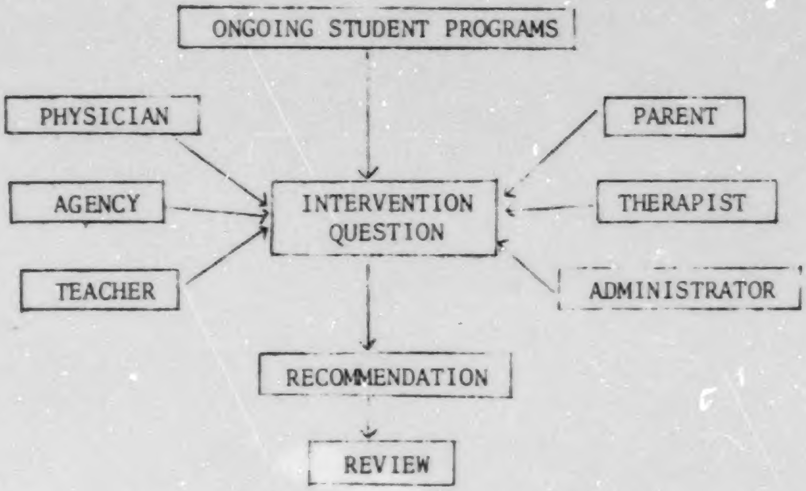

TOTAL SCREENING ASSESSMENT DATA
OCCUPATIONAL THERAPY
LANGUAGE THERAPY
PHYSICAL THERAPY
MOBILITY
EXPLORATION OF RELEVANT PROGRAMS
SOCIAL BEHAVIOR
ACADEMICS
PLAY
SELF-HELP
DIAGNOSTIC TEACHING DATA
PROGRAMMING RECOMMENDATIONS
REVIEW

3. Program assessment: Program assessment involves an ongoing evaluation of students' performance in programs designated through the diagnostic assessment. Criterion referenced tests attached to the students' programs (e.g., motor, language, self-care, math) are used to assess the students' skill development and the efficiency of the programs. (See Appendix A for a detailed description of Program Assessment.) In addition to the Screening Assessment, Diagnostic Teaching Assessment and Program Assessment the model uses three follow-up systems to monitor students' performance. The three follow-up systems are: (1) Intervention Assessment; (2) Change System; and (3) Post-Graduate Review System.

The follow-up systems

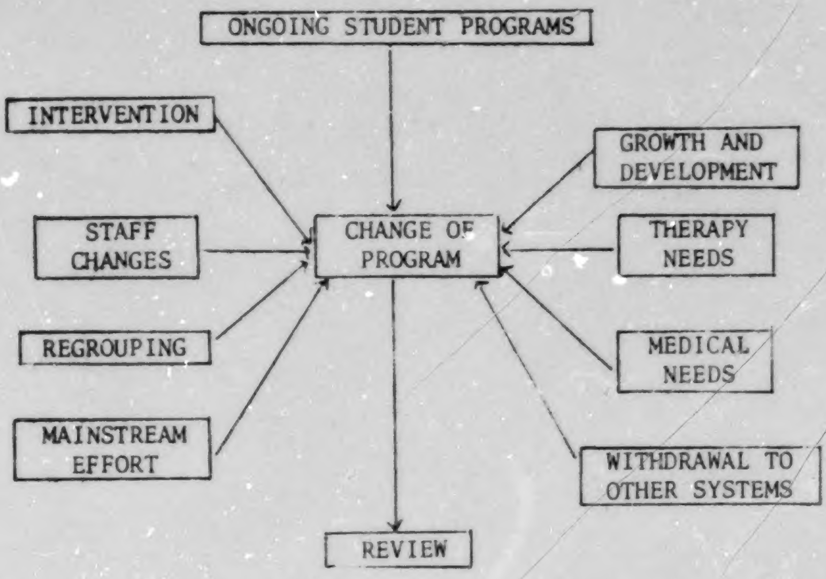
1. Intervention system: An intervention assessment may be implemented whenever any person (e.g., parent, teacher, physical therapist, teacher assistant) acquainted with the students and their programs, questions the appropriateness of those programs. The question may relate to the physical, mental, social or learning status of students. Following a question on program efficacy the school system gathers data from relevant persons (e.g., teachers, physical therapists, language therapists, parents), makes recommendations and periodically reviews the outcome of the recommendations. (See Figure 4)

Figure 4
Intervention System


ONGOING STUDENT PROGRAMS
PHYSICIAN
PARENT
AGENCY
INTERVENTION QUESTION
THERAPIST
TEACHER
ADMINISTRATOR
RECOMMENDATION
REVIEW

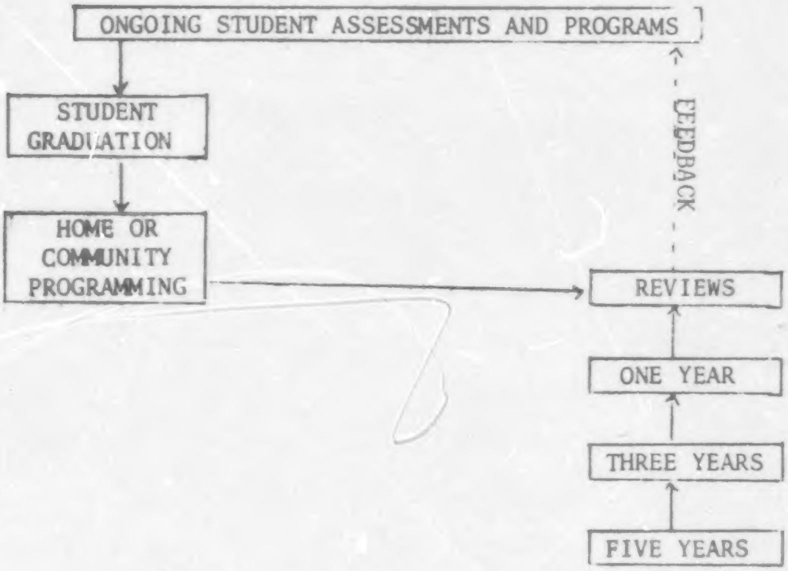
2. Change system: Anytime a major change is proposed in the students' programs the Change System is used. The Change System insures that the critical data concerning students is available and used as a rational basis for recommending change in programs. Also, the system insures that the change is "best", so students don't bounce through a series of programs before an appropriate program is found. Change may occur as the result of: a) the diagnostic teaching assessment; b) changes in teaching staff; c) the normal growth and development of students; d) general regroupings of students; e) mainstreaming efforts; or f) changes in therapy needs. (See Figure 5)

Figure 5
Change System


ONGOING STUDENT PROGRAMS
INTERVENTION
GROWTH AND DEVELOPMENT
STAFF CHANGES
CHANGE OF PROGRAM
THERAPY NEEDS
REGROUPING
MEDICAL NEEDS
MAINSTREAM EFFORT
WITHDRAWAL TO OTHER SYSTEMS
REVIEW

3. *Post-graduate review system*: This system provides follow-up information on students who have left the school system. That is, it provides the school system with feedback on the effectiveness of programs and assessment strategies. This feedback may be used by the school system to continually reassess itself in terms of how well it is preparing students for the realities of living. (See Figure 6)

Figure 6
Post-Graduate Review System


ONGOING STUDENT ASSESSMENTS AND PROGRAMS
STUDENT GRADUATION
HOME OR COMMUNITY PROGRAMMING
FEEDBACK
REVIEWS
ONE YEAR
THREE YEARS
FIVE YEARS

## III. Applying the model

### Screening assessment

The screening assessment for placement of students into a diagnostic classroom is a time for gathering information. It is also the time to gather the appropriate disciplines (multidisciplinary team) together so that the beginnings of appropriate services for students can be delineated prior to the time of their school placement. The multidisciplinary team oversees the screening and placement of students.

When the public schools receive students with exceptional educational needs, it is likely that there is already an accumulating body of information from medical, agency, or preschool sources. This information is used to make the screening assessment. In addition the students' families will have information that may be unrecorded. Therefore, a screening device to be used with families has been developed (See Appendix B).

The receiving team (multidisciplinary - to be referred to as M-Team from this point)[3] will need to consider that information about students may have reached them in bits and pieces from different agencies and may not necessarily represent a consistent picture of the students. It is, therefore, necessary that persons responsible for transitioning students between agencies of facilities recognize the importance of incorporating prior and present information on students and their families into an accurate coherent picture.

Equally important is the notion that the M-Team needs to have an understanding of the programs available to students within the public school setting. It does not do, for example, to have the occupational therapist discuss the fine-motor needs of students without stating objectively how the teaching and therapy unit will program for those needs within students' total environments. It is also important that all who will be involved with particular students have a clear understanding of their role (teacher, parent, therapist) in implementing programs. Clearly, students with severe or multiple handicaps need well-integrated programming from persons who are not in competition for time to work with the student. A clear focus on each program, combined with a recognition of what is necessary for consistent programming across the settings the student will be experiencing is needed.

In summary, the M-Team needs: (1) a precise summary of student experiences prior to school placement; (2) a comprehensive listing of all programs available within the school system; (3) to focus on specific educational objectives; and (4) to interpret and incorporate those objectives at home and at school.

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[3] Appendix C delineates the M-Team procedure developed by the Madison Public Schools.

There will be times when there is either no information or insufficient information regarding students to make the needed programming decisions. When this occurs, the M-Team is charged with calling up sufficient expertise among themselves (with the assistance of the larger professional community) to bring about an adequate screening. This kind of screening is highly dependent upon the clinical and programming expertise of the members of the M-Team, and the capacity of students to perform under unfamiliar evaluation conditions. Because rapid adaptation of severe or multiply-handicapped students to unfamiliar evaluation conditions is unlikely, it is suggested that screening evaluation be done within students' homes incorporating the resources of the family and using materials familiar to the students. The use of screening information by skilled professionals should produce sufficient data to make a "best" class placement for the students. This "best" but sometimes temporary - class placement is referred to as the diagnostic teaching classroom where the diagnostic teaching assessment will be made.

## Diagnostic teaching assessment

The diagnostic teaching assessment is extremely critical, in that program objectives are set for students and a decision on their permanent class placement is made. During the diagnostic teaching assessment school personnel responsible for educational programs and therapies must determine where particular students will fit into the range of programs and therapies available. It is foolish to place a student in a setting where the teacher must provide an appropriate individual program, when there is a class setting where other students are already receiving the same program. Also, during the diagnostic assessment a delineation is made of such things as: (1) the materials which can be used in instruction; (2) the instructional style to which students are most likely to respond; (3) the repertoire of receptive and expressive language that students have available; (4) the best mode of communication (words, signs, gestures); and (5) those things that are reinforcing for use in encouraging learning. The diagnostic teaching assessment should produce a listing of the student's specific needs in terms of programs and therapies; and it should provide suggestions as to the conditions under which students will perform optimally. From such information, it would be possible to draw up a series of program objectives for the students and place them in appropriate programs and classrooms.

## Program assessment

(The model for program assessment appears in Appendix A. It would be well for the reader to utilize Appendix A in conjunction with the discussion below.)

Once comprehensive and properly sequenced programs of instructional objectives have been developed, the assessment of those programs and the evaluation of the students' progress within the programs is a natural outcome. The model for program evaluation has two basic levels; the first is the Initial Assessment of the students entering skills. Initial assessment contains four components: (1) the Pre-Assessment Inventory, (2) Level I Assessment, (3) Level II Assessment and (4) Developing a Teaching Strategy. The second level is Skill Mastery Assessment which has the components of assessing Functional Use and Assessing Skill Performance across tasks, people, language cues and settings. There are also two additional general concerns: (1) Evidence of Generalization; and (2) a Time Line.

### Initial assessment

1) Pre-assessment inventory: Through informal means (observation, discussion with the family, conversation with the student) the optimal setting, materials, persons, language cues, instructional style to be used during initial assessment are determined.

2) Level I assessment: Using those optimal conditions discovered during the Pre-Assessment Inventory, tests of one or more selected objectives are administered to the students and the results recorded.

3) Level II assessment: If the results at Level I are positive, Level II is ignored. However, if the students fail to accomplish the objective, the examiner tries variations of cues, reinforcers, to elicit the desired response. The students' performance using varied conditions is also recorded.

4) Teaching strategy: If the students do not perform the skills required by an objective under any conditions, the instructor may want to set that objective aside temporarily. However, if there is an indication that the students can perform the skill of an objective under selected conditions, the teacher should develop a program and begin instruction.

### Skill mastery assessment

There are two parts to this assessment: 1) Functional Use - a record is kept of each time students perform a skill of concern on a functional task; and 2) Mastery - a test to insure that students can do the skill across language cues is administered. In both parts, it is essential to work with all persons in the students' environment to insure that the skills of an objective have indeed been learned and are being used in a variety of settings.

There is an emphasis on recording any evidence that the students are spontaneously using skills of concern (referred to as Generalization in the model) either during the instructional period or following it. It is suggested that such evidence be recorded anecdotally and kept as additional support to the confirmed mastery of any objective.

Finally, it is emphasized that information relative to the rate of skill acquisition of critical objectives can aid in determining the strengths and weaknesses of students' skills. This can provide the best predictors as to how students will perform over time. It is our belief that such information will provide an accurate picture of the students' various abilities and that such information can be used instead of norm-referenced tests of intelligence and achievement. Such an approach should provide precise information to be used in placement, programming and long-range planning.

## Intervention system

Hobbs (1975) in stating his reasons for believing that we are not, presently, performing satisfactory diagnoses, makes two points that relate to intervention strategies. The first point is that one of our major goals of assessment should be to provide information that contributes to the students' social adjustment. The second point is that we should not overlook those factors in the students' environment that may be adversely affecting their performance - as opposed to the point-of-view that the students are the problem.

The Intervention System assesses the total milieu where the students are functioning, and is concerned with the social-behavioral aspects of that milieu as well as the learning aspects. This intervention assessment model is not an easy one for persons working with students because what may need change are the variables such as room arrangement, grouping, materials, programs, teaching style and so on rather than students. Such an ecological (total environmental) study is the appropriate focus of interventions.

Equally as critical as what is to be assessed in an intervention, however, is who will do that assessment. The fact is that the "who" of intervention may (and probably should) vary from situation to situation and should be highly dependent upon the observable needs within the intervention. For example, let's say a teacher has been instructing according to a mathematics guideline but finds that students are not progressing. The teacher may ask a colleague to sit in, take data and critique what is happening or might ask to be video taped in order to study and analyze the activity. The video taping itself represents an intervention. If students' social behavior is interfering with learning the teacher may wish to signal for assistance with behavior problems. In another instance, the parent of a particular student may be having difficulty with toilet training and request assistance. Here the interventionist might be the teacher, a physical therapist or someone else. The significant aspect of the intervention system is that anyone within the students' environments may signal for consultation or direct assistance at any time they believe such an intervention to be in the best interest of the students.

Finally, we should consider briefly intervention as advocacy. Referring to the U.S. Department of Health, Education, and Welfare (HEW) requested study reported by Hobbs (1975) we find two critical directives. The first has to do with the need for commitment by one agency across time to handicapped individuals and their families; and the second pinpoints the agency that is in the best position to fulfill that commitment - the public school. It is the contention of the HEW report that the school is the institution that is most responsible for "helping the family to induct the child into society." Hobbs does not preclude the use of other agencies; but, he warns that specialists (here he refers to educators, physicians, psychologists, social workers, and therapists of various kinds) must become applied human ecologists, devoted to making the normal child-rearing units of society do their work. He suggests that "the professional person assisting a family in the care of a handicapped child or youth should define his role as consultant to the parent, not as dominant authority in a transient relationship." The implication for evaluation is this: our response as interventionists must be to remain as objective as possible so that we can view not just the immediate situation but the total of the students' ecological systems in order that we may behave as advocates within what may well be "a transient relationship."

## Change system

There are, from time to time, reasons to change students' programming. The following are some (but perhaps not all) instances when change becomes imminent: 1) as a result of priorities in the students' needs having changed, 2) as a result of restructuring groups due to crowded conditions, year-end changes, teacher resignations and the like, 3) as a result of an intervention such as is described above, 4) as the result of normal growth and development, and 5) as the result of mainstreaming efforts.

When there is a need for change of placement, it is essential that there be critical data about students available so that recommendations for change have a rational basis and result in a smooth transition for students. Also, as in the instance of students' placement into programs and therapies, it is critical that any changes be assured as "best" for the students so that they don't end up bouncing through a series of placements.

Changes should be smooth for the sake of students and their families. It is less likely that there will be frequent or erratic changes for individual students or groups of students if: 1) the model of the multidisciplinary team (M-Team) is maintained; 2) the parents are an integral part within the students' school life; and 3) programs (content and procedures) themselves are properly spelled out, articulated, and relevant to students' needs. Of course, it would be equally debilitating to maintain students in programs where they no longer belong simply because it is not "time" to make changes.

In short, the model recommends that placement: 1) be fluid but regulated within the structure of evaluation; 2) be followed by systematic reviews (so that the success of the change can be assured); and 3) be monitored by persons familiar with the students - including their families.

## Post-graduate reviews

Finally, there should be a periodic review of status of students who have graduated to other community agencies, or homes within the community. Graduation may result in work (sheltered or competitive) within the community, group living for social and recreational purposes, life at home with a natural family, or adjustment to residential care centers such as nursing homes or state institutions. Reviews (assessments) of students' performances in these life-adjustment settings will provide feedback information to the school system as well as make it possible for the school system to intervene as advocate if that should be needed. Such reviews could continue throughout the natural lives of the students; but, in a more practical sense, reviews after one, three and five years of community living would seem to be the minimum number of follow-up contacts.

This final component of the model recognizes the system's need to know how well students have fared as a result of their contact with the system. By the time the students have reached 21 years of age and are (or are about to become) members of the community at large, the model will have accumulated considerable data that may be coupled with additional accomplishments beyond the graduation date. The reviews may indicate that students lack essential skills. The skills which are lacking may be a few simple self-help and recreational skills that assure inclusion of the individual in a group of a residential setting, or they may be complex skills which will enhance the students' maintenance and growth in our society's competitive social and labor complex.

There are two essential components of the review model: a) the model provides for summative information about students that can be used to develop life objectives away from the school (this can begin either at or prior to the graduation at age 21); and b) the model provides for client feedback at 1, 3, and 5 years.

The obvious reason for reviews (follow-up) is that they enable the system to continue re-assessing itself in terms of how well it is preparing students to meet the realities of living. In addition, such reviews maintain the school as a relevant entity throughout an extended period of the life-space of students rather than having the school viewed as an "in-block" experience out of the life space.

In addition to the Post-Graduate Reviews alluded to in the General Model (Figure 1), there are a number of times when planned review should occur. Here is a listing, in brief, of those times:

1. following screening activities when the M-Team is making decisions regarding diagnostic placement;
2. following the diagnostic placement when the M-Team is ready to recommend permanent programs and therapies;
3. at various times during the students' enrollment in programs and therapies; (e.g., parent conferences, quarterly or yearly reporting, or critical points in the program sequence);
4. following an intervention; and
5. following any change in programs, therapies, schools, etc.

## IV. Summary characteristics of the model

What has been presented here is an alternative to the use of traditional testing procedures with retarded and multiply-handicapped students. Citing Hobbs (1975) one final time:

> "The routine use of intelligence tests...in the schools is not defensible. Optimum individual development, not maximum organizational efficiency should be the goal of the schools. Schools should have resources sufficient to allow everyone to demonstrate his competence through performance. There is little justification for relying on a prediction of performance (an intelligence test, for example) when performance itself can be the basis for classification - should classification, in fact, be required." (p. 48)

In addition, it is expected that utilizing the students' acquisition of objectives and the speed of that acquisition will result in more accurate and useful ways of describing students.

Finally, and in summary, it is suggested that the model incorporates the following positive attributes:

Goal-oriented - The model delineates and implements specific educational objectives at the time students enter programs, and continues to monitor and change program objectives relative to student performance.

Ecological - The model always evaluates students' performances in the context of their total environment.

Eclectic - The model recognizes the public schools as the central agency for serving all persons of school age, but seeks input and feedback from all community agencies that are concerned with students' performance in their total environment (e.g., school, home, work, recreation).

Dynamic - The model provides for intervention whenever students' programs are questioned and program changes as indicated.

Relevant - The model views evaluation as broadly based using all persons within the students' environment as potential evaluators. Furthermore, program efficiency is evaluated relative to students' performances in post-school settings.

Conserving - The model provides for the collection, storage, and retrieval of relevant data.

## Appendix A

## PROGRAM ASSESSMENT

Clarence DeSpain and Weston Williams

The model is portrayed in Figure 7 and basically consists of seven steps:

1. Box A: Prior to formally assessing students, become familiar and comfortable with them. Informally assess students' skills and what environmental events control their behavior. Use information from this informal assessment to determine optimal assessment conditions.

2. Box B: Assessment Level I - Assess one or more objectives from the skill sequence under optimal but controlled conditions. If students fail the objective, go to Box D (Assessment Level II); if they pass, go to Box H (check for functional use).

3. Box D: Assessment Level II - If students could not perform the skills required by an objective in Level I assessment, assess students' behavior under varied conditions to determine under what conditions (e.g., cues, models, prompts, reinforcement) they can perform the skills. Use information from this assessment to develop an instructional strategy (Box F).

4. Box F: Teach students the target skills.

5. Box H: Assess student mastery of skills. First verify that they can use the skill in the performance of functional tasks which frequently occur (e.g., setting the table, dressing). If they use the skill across functional tasks, formally check skill performance across persons, materials, settings and language cues (Box I).

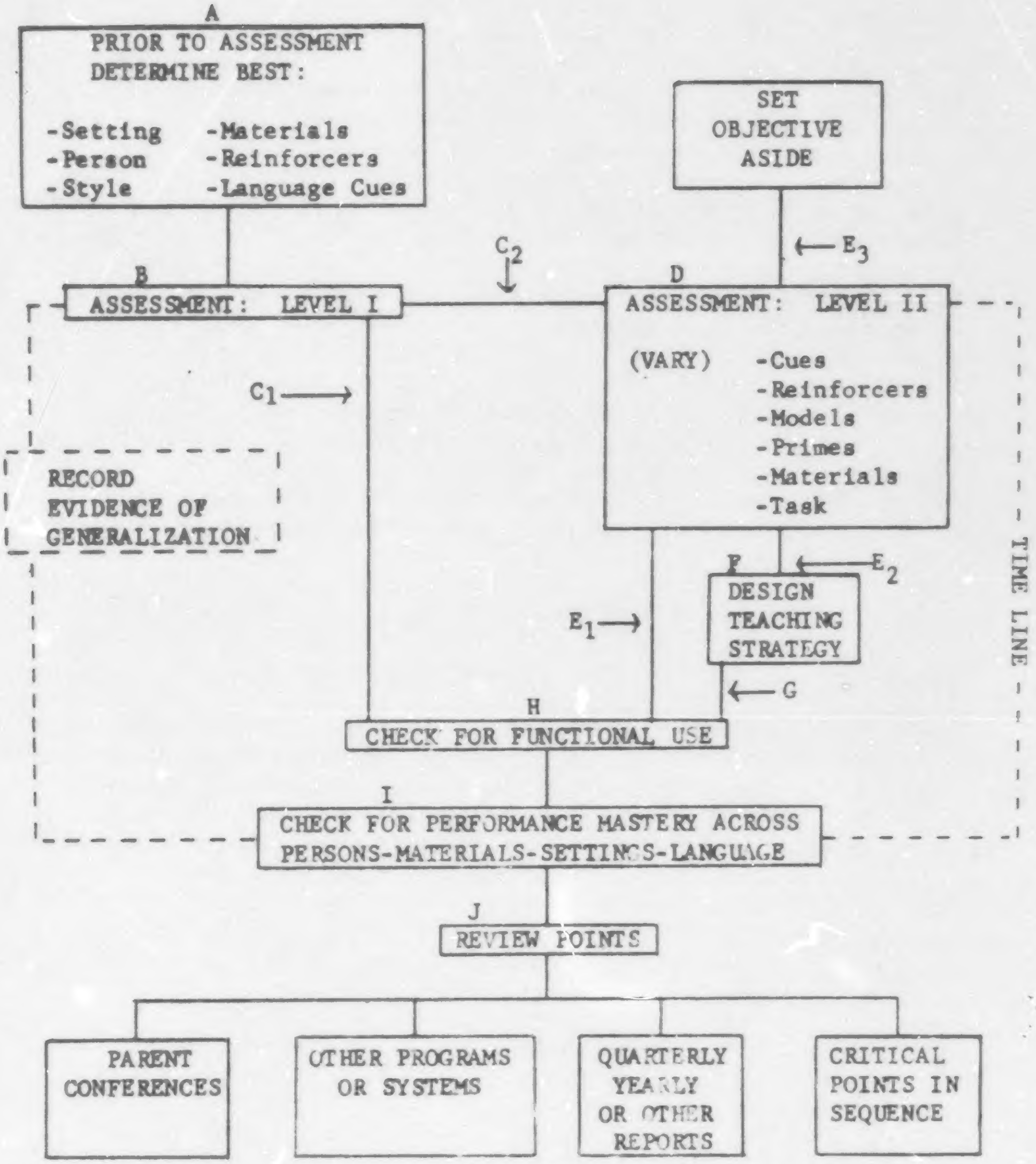
6. Box I: Verify student performance of skills across persons, materials, settings and language cues.

7. Box J: Review (reassess) student skill performance.

Note: This is a part of the broader paper titled, "Skill Sequence and Curriculum Development: Application of a Rudimentary Developmental Math Skill Sequence in the Instruction and Evaluation of Severely Handicapped Students." Weston Williams, Peggy Coyne, Clarence DeSpain, Fran Johnson Nancy Scheuerman, Jacalyn Stengert, Barbara Swetlick, and Robert York.

Figure 7

MAZE EVALUATION PROGRAM
ASSESSMENT PHASE


A
PRIOR TO ASSESSMENT
DETERMINE BEST:
-Setting
-Person
-Style
-Materials
-Reinforcers
-Language Cues
SET
OBJECTIVE
ASIDE
E3
C2
B
ASSESSMENT: LEVEL I
D
ASSESSMENT: LEVEL II
(VARY)
-Cues
-Reinforcers
-Models
-Primes
-Materials
-Task
C1
RECORD
EVIDENCE OF
GENERALIZATION
F
E2
DESIGN
TEACHING
STRATEGY
E1
G
TIME LINE
H
CHECK FOR FUNCTIONAL USE
I
CHECK FOR PERFORMANCE MASTERY ACROSS
PERSONS-MATERIALS-SETTINGS-LANGUAGE
J
REVIEW POINTS
PARENT
CONFERENCES
OTHER PROGRAMS
OR SYSTEMS
QUARTERLY
YEARLY
OR OTHER
REPORTS
CRITICAL
POINTS IN
SEQUENCE

In our judgement the evaluation model has the following attributes:

Validity - The model measures student performance through criterion based objectives under optimal student performance conditions.

Reliability - The model provides for confirmation of student performance across person, settings, and materials.

Generalizability - The model can be adopted for use across a wide variety of instructional programs.

Ecological - The model insures functional performance of skills across the total of the student's environment.

Conserving - The model allows for an orderly recording of achievement and rate of achievement for every student so that retrieval of information is easily achieved.

Flexible - The model encourages all key figures in the student's environment to be evaluators.

The following narrative attempts to explain the flowchart. The model is divided into two broad assessment categories: I) Initial Assessment, which includes a pre-assessment inventory, two levels of actual assessment and a teaching strategy; and II) Skill Mastery Assessment, which includes an assessment of the functional use of a skill, plus assurance that the skill is performed across persons, cues, materials.

## I. Initial assessment

### A. Determination of optimal assessment conditions

Our first assumption is that in order to make a valid assessment of students' performance on a given objective, we must provide conditions that will elicit the students' optimal performance. Thus, it is important to become familiar and comfortable with students before you begin formally evaluating them. This will allow you to make the evaluation situation pleasant and nonthreatening, facilitating a valid assessment of the students' skills. With new students you may have to spend several days playing with them and presenting evaluation tasks informally. Through informal assessment, prior to initial assessment Level I, attempt to determine:

1. the optimal setting for administering the assessment (e.g., perhaps the table where students usually perform tasks);
2. the person whom is most likely to elicit optimal performance from the students;
3. materials familiar to the students which should potentially insure optimal performance;

4. potential reinforcers which have in the past elicited good performance;

5. language cues to which the students have demonstrated they can correctly respond;

6. a style of task presentation (e.g., the natural style of the person for whom the students work well) that elicits optimal performance from the students.

B. Assessment: Level I

Once the potentially optimal conditions have been delineated an assessment of one (or more) selected objectives is administered under controlled conditions but conditions which should elicit optimal performance.

C. First decision point ($C_1$ or $C_2$)

$C_1$ If the student performs the objective(s) at a predetermined acceptable criterion, the decision ($C_1$) is to move to an assessment of skill mastery (H, I, J) but at a later date.

$C_2$ - If the student does not perform at the acceptable criterion in Level I, the decision ($C_2$) is to move immediately to Level II of assessment (D).

D. Assessment: Level II

If students could not perform skills in Level I assessment, Level II requires the evaluator to assess students' performance under varied conditions (e.g., varied cues, reinforcers, models, primes, materials, tasks) in an attempt to determine under what conditions the student can correctly perform a skill. The students' performance in various conditions should be carefully recorded.

E. Second decision point ($E_1$, $E_2$, or $E_3$)

$E_1$ - If Level II assessment indicates the students can correctly perform a skill across varied conditions, skill mastery may be assessed (H, I, J).

$E_2$ - If students can at least partially perform the skills required under varied conditions, the varied conditions which produced correct performance are incorporated into a teaching strategy (F) for the students.

$E_3$ - If it is found that students cannot perform the skills required by the objective under any of the varied conditions, the decision ($E_3$) is to set the objective aside until there is evidence that students can learn the skills required by the objective.

F. Teaching strategy

Whoever is charged with designing students' programs will use the data from the Level II assessment to design and implement an appropriate instructional program.

### G. Third decision point (G)

When students demonstrate that they have learned the skills required by the objective through an instructional program, skill mastery (H, I, J) is assessed.

## II. Skill mastery assessment

Subsequent to instruction on an objective (F) or acceptable performance in Level I assessment (B) students' skill mastery is assessed (H, I, J).

A skill may be considered mastered only after students can functionally use the skill and perform the skill across people, settings, language cues, tasks and materials which frequently occur. At this point it is necessary to make a distinction between skill mastery and generalization. Generalization may be said to have occurred when after students have been taught to perform a skill across a limited number of people, settings, language cues and tasks without further instruction they perform the skill across additional settings, people, tasks and language cues.

Skill mastery may be but does not have to be the same as skill generalization. Obviously, if after instruction across a limited number of settings, people, functional tasks and language cues students demonstrate skill mastery (generalize the use of skills across additional tasks) they will move rapidly through the skill sequence. However, the possibility exists that some students will not generalize the use of a skill and may have to be taught to perform the skill across all the designated settings, people, functional tasks and language cues before they demonstrate skill mastery.

An essential component of facilitating skill mastery should be the involvement of the students' parents or guardians. That is, through parent conferences parents should help the teacher determine the skills their children are being taught. In addition, parents should be taught how to request and teach their children to use the skills on functional tasks at home. For instance, if students are learning one-to-one correspondence, the children's parents can be requesting them to set the table at home. To facilitate the parents' learning how to teach and require their children to use skills at home periodic workshops can be held where parents and teachers go over the curriculum and procedures for adapting it to functional home-living tasks.

### H. Functional use

The most critical feature of the model is (H) the assessment of students' functional use of a skill. The teacher with assistance from students' parents or guardians should report what functional tasks students perform a skill across. The report should indicate what cues the performance of tasks (e.g., the task itself, verbal language cues) what the tasks are and the date. That is, both parent and teachers should have a similar data sheet and when they observe students independently perform a skill on a function task they should record the cue, task and setting and date. The following recording format appears to be appropriate.

Task Setting

| Skill | | School | Home | Other |
|---|---|---|---|---|
| Less | tasks<br>cues<br>dates | | | |
| More | tasks<br>cues<br>dates | | | |
| Equivalence | tasks<br>cues<br>dates | | | |
| 1-to-1 Correspondence | tasks<br>cues<br>dates | | | |
| One-Many | tasks<br>cues<br>dates | | | |
| Sorting | tasks<br>cues<br>dates | | | |

If the data indicates that over time a student performs a skill across functional tasks, people, settings and language cues, then a formal test of skill mastery across these dimensions should be implemented (I).

### I. Confirmation of skill performance across people, settings, materials and language cues

Students are required to demonstrate that they can perform a skill across a variety of selected persons, materials, settings and language cues. Skill mastery is confirmed when several persons have verified that the student can perform a skill across functional tasks and across persons, materials, language cues, and settings.

### J. Review points

Students' mastery of skills should be periodically assessed, reassessed and reported. The assessment, reassessment and reporting of skill mastery should coincide with: a) parent conferences, b) quarter and/or semester periods, and c) the students' mastery of selected critical curriculum objectives. When any one of the events, a, b, c occurs teachers should use their data on students' skill acquisition and if appropriate student performance on a formal evaluation of skill mastery to list at least:

1. For what people a student performs the skill;
2. In what settings a student performs the skill;
3. Across what materials a student will perform the skill;
4. In response to what language cues a student will perform the skill;
5. Across what functional tasks a student has demonstrated that he/she can perform the skill.

Student performance data may be summarized on a student evaluation sheet (report card) of the following form.

| Skill | Mastered | Cues | Tasks | Instruct. in Prog. | Cues | Tasks |
|---|---|---|---|---|---|---|
| Less | | | | | | |
| More | | | | X | "Take more"<br>"Give me more"<br>Etc. | Pennies<br>Food at snack<br>Etc. |
| Equivalence | X | "Find equal sets"<br>"Are they equal"<br>"Make them equal"<br>Etc. | Pennies at the store<br>Candy at home<br>Teams at recess<br>Etc. | | | |
| 1-to-1 Correspondence | X | "Are there enough"<br>"Are there too many"<br>"Give each ___ a ___"<br>"Put a ___ on each ___"<br>"Put a ___ next to each ___"<br>Etc. | Setting table at home<br>Passing out food at lunch<br>Choosing teams at recess<br>Etc. | | | |

Comments:

Suggested Home Activities:

This information can then be used for at least the following purposes:

1. Reporting to parents and the school system a student's progress.
2. Assessing a student's rate of progress. That is, how fast a student is progressing through the skill sequence.
3. Evaluating the skill sequence. That is, if data from many students indicates that most students are requiring an unusual amount of instruction to master a skill, it may be that the skill sequence fails to delineate appropriate prerequisites or instructional procedures necessary for the acquisition of that skill.
4. Evaluating the effectiveness of a teacher's program. If a teacher is moving his/her students through skills at an unusually rapid pace, the teacher may request that his/her instructional program be closely evaluated to determine why it is usually effective so that others may emulate it. Conversely, if a data indicates that students are mastering few or no skills, a teacher may request that a teacher who is experiencing more success help him/her restructure his/her program or request that a curriculum specialist evaluate the program.

Evidence of generalization

Concurrent to and following instruction of a skill (F) persons in the students' environment should be aware of the instructional objectives and record (anecdotally) any evidence of generalization of the skill being taught.

Importance of the time line

There is an emphasis on recording rate of student progress through critical objectives. This provides information on student learning rates. Student learning rates are critical in that they can be used to make statements (predictions) concerning a student's learning potential (rates). Information on what skills students can perform and student acquisition rates can be used in the stead of traditional testing (e.g., IQ, achievement tests). We believe this information will be more valid and viable than information gleaned through traditional evaluation.

Conservation of accumulated data

Finally, the model lends itself to the conserving (storing and retrieving) of critical data and potentially provides useful data to all who have use for it (parents, teachers, administrators, psychologists). The chart portrayed below (Figure 8) is for use with the evaluation model presented. It is included with the caution that neither it nor the model has been given longitudinal testing in the classroom.

Figure 8

STUDENT ______________ YEAR ______________ PROGRAM ______________

SCHOOL ______________ SEMESTER ______________

| SKILLS & OBJECTIVES | ASSESSMENT: LEVEL I | | ASSESSMENT: LEVEL II | | FUNCTIONAL USE | | | PERFORMANCE MASTERY | | | | | | | | CONFIRMING PERSON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Persons | | Setting | | Mater. | | Lang. | | |
| | ✓ | Date | ✓ | Date | ✓ | ✓ | ✓ | ✓ | Date | ✓ | Date | ✓ | Date | ✓ | Date | |
| 1. IMITATION | | | | | | | | | | | | | | | | |
| MOTOR | | | | | | | | | | | | | | | | |
| VERBAL | | | | | | | | | | | | | | | | |
| 2. SETS | | | | | | | | | | | | | | | | |
| 2. | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | |
| 3. ONE-MANY | | | | | | | | | | | | | | | | |
| 3. | | | | | | | | | | | | | | | | |

ETC.

## APPENDIX B

### M.A.Z.E. PROGRAM
### SCREENING

Clarence DeSpain and Lisbeth Vincent

I. Identifying Data

A. Child's Name

D.O.B. Sex

B. District of Residence

C. Past School Placements

D. Past Residential Placements

E. Past Foster Placements

F. Legal Guardian

Address

Telephone

G. Parent

Address

Telephone

H. Lives with

Address

Telephone

Relationship

II. Medical and Psych-social Information

A. Primary physicians, clinics, agencies Permission to Share

1.

2.

3.

B. Physical and/or sensory impairments, seizures

C. Medications By Whom When

1.

2.

D. Prosthetics

1.

2.

E. Wheelchair

1. needs pusher ____
2. transfers self ____
3. propels self ____

III. Mobility

A. General

Comments

1. has head control
2. sits supported
3. sits unsupported
4. creeps or crawls
5. stands supported
6. stands unsupported
7. walks supported
8. walks unsupported
9. climbs stairs
    a. two per tread
    b. one per tread
10. runs
11. jumps
12. uses bike, trike, etc.

B. Can participate in gym

1. restrictions

IV. Self Help

A. Toileting

Comments

1. diapered
2. dry for a time
3. indicates when wet
4. indicates when wants to go
5. toileted on schedule
6. occasional accidents
7. independent

B. Feeding

1. general
    a. held and bottle fed
    b. finger feeds
    c. uses spoon assisted
    d. uses spoon unassisted
    e. uses cup assisted
    f. uses cup unassisted
    g. needs to be fed
    h. independent
2. diet restrictions
3. time required to eat (neatness)
4. consistency of food
5. specific difficulties

C. Dressing | Comments

- 1. general
  - a. dressed by caretaker
  - b. child helps caretaker
  - c. takes off clothes
  - d. puts on clothes
  - e. fasteners
  - f. independent
- 2. type of clothing child wears

D. Personal Hygiene

- 1. general
  - a. washes hands
  - b. washes face
  - c. brushes teeth
  - d. takes bath assisted
  - e. takes bath unassisted
  - f. has begun menstruating
  - g. indicates when menstruating
  - h. cares for own menstruation
- 2. special needs

E. Bedtime and Sleeping

- 1. general
  - a. bedtime pattern
  - b. sleep pattern
  - c. rising pattern
  - d. napping
- 2. specific difficulties

V. Social and Recreational

Comments

A. Appropriate Behaviors

1. eye contact
2. smiles
3. accepts physical contact
4. initiates physical contact
5. imitates others
6. complies to reasonable requests
7. plays with toys, puzzles, etc.
8. plays with peers
9. watches TV
10. plays organized games
11. good social communication
12. uses free time constructively

B. Inappropriate Behaviors

1. isolates and/or stereotypes
2. hurts self
3. hurts others
4. has tantrums
5. runs away

C. Known Social or Other Problems

D. Parent Management Techniques

VI. Speech and Language — Comments

A. general

1. babbles, uses jargon
2. uses gestures to communicate or indicate needs
3. understands parent gestures
4. understands what parent says
5. follows request for:
   a. no
   b. sit down
   c. come here
   d. stay here
   e. stop
   f. give me
6. follows complex directions
7. uses single words such as:
8. uses sentences such as:
9. has good verbal communication skills

B. Specific Speech or Language Problems:

VII. Traditional Academics

Comments

A. general

1. knows (or can indicate)
   - a. colors
   - b. shapes
   - c. numbers
   - d. letters
   - e. words
   - f. common objects
2. listens to stories
3. looks at books
4. identifies pictures
5. reads
6. writes name
7. writes other words or sentences
8. counts to:
9. adds
10. subtracts
11. tells time

B. Specific Academic Problems:

VIII. Home and Community Living Skills — Comments

A. general

1. makes bed with assistance
2. makes bed without assistance
3. sets table
4. clears table
5. washes dishes
6. vacuums
7. dusts
8. feeds pets
9. makes own snacks
10. puts away clothes, toys, etc.
11. takes out the trash
12. works on the yard
13. rides bus
14. goes to store (uses money)
15. goes to movies, concerts, etc.
16. moves about the neighborhood safely

B. Other

C. Specific Problems:

IX. Parental Expectations

A. Short Term

B. Long Term

# APPENDIX C

## M-TEAM PROCEDURE AND PROPOSED REVISION

Clarence DeSpain and Eve Gadberry

### Receiving phase

1. A referral is received at any source.

   a. Central office is notified (on form) and basic information is logged.
   b. A program coordinator is asked to act upon the referral.

2. The program coordinator assigns a case manager.

3. The case manager meets with the family, fills out a screener, obtains needed forms and collects available data.

4. Waiting period: up to 10 days.[4]

### Evaluation phase

5. The case manager, evaluator, and program coordinator meet to do the "referral review" of available data and to determine which disciplines will be required during the evaluation phase.

6. The case manager (or his secretarial aide) will make available copies of all relevant data, including screener, to members of the M-team.

7. Case manager schedules pre-evaluation meeting of involved disciplines, allowing at least 24 hours for team to read material. (In the event that there are no records available, case manager will present screener at the time of pre-evaluation team meeting in order to facilitate decision-making.)

8. Pre-evaluation meeting where:

   a. M-team reviews data together (general).
   b. each discipline presents information deemed necessary for placement but not in the record, and proposes procedures for obtaining that data.
   c. disciplines clear any overlaps among themselves.
   d. case manager prepares an informal agenda--order, procedure, content, and time required, constructed from b. and c. above.
   e. case manager insures that the agenda and time of evaluation reaches multi-disciplinary unit at time of evaluation; and that the parents have the same agenda, date, time, and place.

---

[4] "Days," to date, refers to working days.

9. Case manager contacts family and schedules an evaluation session.

10. Initial evaluation session is completed. If necessary, follow-up sessions are scheduled and completed.

Recommendation phase

11. Within three days following completion of evaluation, the team meets to formulate recommendations and provide supportive data in writing which the case manager compiles and formalizes.

12. Case manager reports findings to coordinator for decision-making.

13. Case manager schedules a meeting with the family to discuss recommendations.

Placement phase

14. Meeting with the family is completed. Family signs M-team report indicating either agreement or disagreement with the recommendations and placement. At this meeting, if parents are in agreement with the designated placement, student enrollment forms and bus forms are completed and parents given the medical-physical form to be completed by their family doctor and orders for therapy if appropriate. The principal of the designated school should be informed of the new enrollment and forms particular to that school also filled out by the parents.

15. Case manager submits M-team report signed by the family to coordinator for final initialing.

16. Coordinator has copies distributed to the following:

    a. central files,
    b. DPI, along with the psychologist's report and individual enrollment request for all orthopedic children and others if state class lists have already been submitted,
    c. designated school,
    d. originator of the M-team report.

17. Child begins school.

Diagnostic and review phase

18. Re-review 30 days following placement. M-team members will support or revise original recommendations at that time.

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# COMMUNITY TRANSPORTATION: TEACHING SEVERELY HANDICAPPED STUDENTS TO RIDE A PUBLIC BUS SYSTEM

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Abstract: Ten severely handicapped students were taught to use independently a public bus system in Madison, Wisconsin, to obtain food, clothing, recreation and medical and dental assistance. The program was comprised of two skill levels: 1) choosing and riding buses to destinations supplied by teachers; and 2) choosing and riding buses to destinations determined by students. All ten students performed at criterion on the skills taught within the first level, but only six students performed at criterion on the skills taught within the second level. In addition, it appeared that some of the skills taught were functional across varying bus riding conditions in that students manifested skills in situations in which they did not receive instruction. Included in the program are relatively detailed task analysis and descriptions of the instructional materials and teaching procedures utilized.

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## Introduction

This program was designed to teach severely handicapped students to ride a public bus system independently. Bus riding was taught as a functional skill which might provide a means to obtain such vital commodities as food, clothing, recreation, and medical and dental assistance. The students who participated ranged in age from 14 through 18 and were enrolled in Badger School, a self-contained public school for severely handicapped students in Madison, Wisconsin.

This program can be viewed as comprising two skill levels. Within the first level (Phases I, II & III) students were taught to ride city buses to specific destinations supplied by the classroom teacher. The second level (Phase IV) entails more complex skills in that it was essentially a problem solving component designed to accommodate to individual current and future transportation needs. Stated another way, Phase IV was an attempt to control for the possibility of a student becoming dependent upon the particular instructional materials and teacher assistance used in Phases I, II & III. This assistance, of course, would not be present in, or may not be relevant to, future transportation settings.

Obviously, functional bus riding skills are only one of many very complex skill clusters that severely handicapped individuals must acquire in order to act independently and efficiently in diverse, demanding, complex, changing community environments. Thus, the skills referred to here should be viewed only as components of a more comprehensive and complex independent community functioning curriculum.

However, as part of an independent community functioning curriculum this program attempted to provide severely handicapped students with the skills necessary to use one mode of transportation (buses) in order to get to grocery stores, doctor offices, theaters, restaurants and parks. Other programs, some already operative, have been designed to teach these students to use such facilities once they arrive, to use money to make purchases, to tell time so that they can determine when a movie begins or when to honor a doctor's appointment, etc.

Problems inherent in the complexities created by changing community environments surfaced continually. The Madison Metro bus system, although a good system from the point of view of the number of buses in operation, coverage of the city and hours per day in service, has many inconsistencies. Many nonhandicapped persons may adapt to these inconsistencies with little, if any, disruption. Most severely handicapped students, however, must be taught how to adapt to them. For example, Madison bus stops generally have a particular sign stationed at a painted curb. At a number of bus stops, though, the format of the signs vary; the curbs are not painted or painted in a variety of colors; and bus stop signs are not always placed in the same part of a city block.

Attempts were not made to teach students to adapt to all inconsistencies they might possibly encounter. However attempts were made to provide some experience with potential problems by occasionally placing students in inconsistent situations as they rode buses and allowing them to make errors. It was hoped that with repeated interactions they would adapt to many real or potential problem situations across a variety of bus riding conditions.

The structure of the bus system was not the only source of problems. Since the most important phases of the program involved the students riding an actual city bus, large blocks of time had to be spent outside the classroom. This, of course, reduced the time available for acquiring other equally important skills. Generally an afternoon school session (approximately three hours) was required to complete one round trip on a city bus and the return to school. In an effort to attenuate this problem a video tape component was developed in which students were presented with video tapes of bus routes in an attempt to reduce the need for teachers riding with and pointing out various destinations when instruction on a real bus route was in progress.

The extent to which parents would allow their children to use the buses independently once they learned the skills was also an issue of concern. The classroom teacher hoped to circumvent possible difficulties in this area by continually explaining the goals and procedures of the program to the parents. Parents were also informed of their children's progress in related programs that were being implemented which would eventually require a transportation component for their completion. This was done to stress further the functional aspect of bus riding to the students and to demonstrate their safe, efficient and competent use of this mode of transportation for their parents. For example, parents were kept abreast of their childrens' progress in a program designed to teach the arranging and keeping of extra-school social appointments with classmates. Ultimately, the means by which students would keep these appointments would be the public bus system. In this way additional independent community functioning skills were taught, extending and emphasizing potential uses of public buses while hopefully dispelling parental fears.

The school principal, realizing the potential importance of independent transportation skills, was quite cooperative. Money was made available to help implement the program; time away from school was allowed and supported; etc. Thus, many potential administrative concerns which often impede programs such as this were avoided.

Finally, although this program was designed for use within the Madison Metro bus system, hopefully it can be modified and used to teach severely handicapped students to ride bus systems in other cities with a minimal amount of difficulty.

## Method

### Students (Ss)

The ten Ss who participated in the program were enrolled in classes for the severely handicapped at Badger School, a public school in Madison, Wisconsin. Chronological ages ranged from 14.4 to 18.8 years ($\bar{X}$ CA = 17.0). Full scale intelligence test scores from either the Weschler Intelligence Scale for Children (WISC) or Stanford Binet (Form L-M) ranged from 47 through 75 ($\bar{X}$ IQ = 50.0). Medical and psychological classifications included Down's Syndrome, Athetoid Cerebral Palsy, hearing impaired, schizophrenic, brain damaged and severe seizure involvement.

### General Instructional Procedures

#### Teaching Procedures

A. The teacher (T) presented each cue once. If S responded correctly, T followed each correct response with praise.
B. If S did not respond, T repeated the cue. If S still did not respond, T repeated the cue and modeled the correct response. T then presented the cue again. This procedure was repeated until S emitted the correct response. A correct response, when using this procedure, was followed by praise.
C. If T presented a cue and S responded incorrectly, T quickly said, "No." T then implemented procedure B above.
D. During baseline trials T presented a cue and made the phrase "Thank you" contingent upon correct, incorrect or no responses.

### Data Collection and Criterion Performance

Whether during baseline or teaching trials, each correct or incorrect response was recorded on a data sheet (See Appendix IV). In addition, if S failed to emit a response, an incorrect response was recorded. When S responded correctly after a correction procedure was employed, no data was recorded. A criterion of three consecutive correct occurrences of each response or sequence of responses without assistance from T was required before S was judged to have mastered the skill or skills of a particular phase or step.

At the beginning of each new phase and step baseline information was secured. Baseline measures consisted of a presentation of all the cues in a particular step for three consecutive trials. If S performed at criterion during baseline trials, instruction was not considered necessary. If S responded incorrectly, he/she received instruction after the three baseline trials were completed.

During teaching components of a particular phase or step, if S responded correctly to all the cues for three consecutive trials, he/she had reached criterion and moved on to the next step.

Materials

- buzzer - 12v D.C.
- rope
- cardboard
- paint - white, gray, blue, black, red
- red and yellow adhesive tape
- 3 x 6 index cards without lines
- picture of a Madison Metro Bus
- Madison Telephone Directory
- map with bus routes drawn in of the city of Madison, Wisconsin
- wooden poles
- combinations of 15 and 25 cents
- videotape recorder
- videotape camera
- batteries (Size D)
- continuous contact switches
- videotape monitor
- various lengths of electrical wire
- light bulbs (small 6v D.C.)

A simulated cardboard Madison Metro bus was constructed for use in the classroom. This bus was large enough to serve as a functional facsimile of a city bus (6' x 12' x 5 1/2') although it was stationary. The bus was painted white, blue and gray. Seats were placed inside the bus. The interior also contained a black coin box, a driver's seat with a steering wheel and gauges drawn on cardboard placed in front of it, and a buzzer which was connected to a rope running the length of the bus. A bus stop was constructed outside the bus. It consisted of red and yellow tape attached to the floor to simulate the coloring of the curb at some bus stops along with a sign that read, "No Parking Bus Stop," in red letters on a white background.

Vocabulary words taught during various steps in the program were printed individually on white index cards. These cards were also used for the printing of individual bus route cards (Appendix I). One bus route card was printed for each bus route. A bus route card consisted of the names of the bus route going to and coming from "Capitol Park."[3] It also listed the names of five places S could go to along each route.

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[3] "Capitol Park" and "Capitol Square" will be used interchangeably throughout the program. These words refer to the circular drive in the center of Madison where the State Capitol building is located and where all the Madison Metro bus routes originate and end.

## Program Design and Task Analysis

**Phases:**

I: Teaching Ss to ride a simulated city bus in the classroom.

II: Teaching Ss selected places in the city of Madison where food, clothing, opportunities for recreation and other services could be obtained, and to determine what bus to take in order to reach those places from Capitol Park.

III: Teaching Ss to ride an actual city bus to and from Capitol Park to obtain the food, clothing, recreation opportunities or other services listed on the bus route cards.

IV: Teaching Ss to determine what buses to take to places that do not appear on bus route cards.

**Phase I:** Teaching Ss to ride a simulated city bus in the classroom.

Step 1 - S tells T the differences between a school bus and a city bus and what is meant by the term destination.

Step 2 - S labels the various parts of a Madison Metro bus, recognizes a bus stop and demonstrates knowledge of the student fare.

Step 3 - S emits the following behaviors in sequence after T's cues have been faded using a simulated Madison Metro bus:

a. S says where he/she wants to go

b. S walks to a bus stop

c. S waves bus to a stop

d. S reads destination sign on front of bus

e. S enters the bus by front door

f. S hands the driver the bus route card and says: "Let me off near __________."

g. S pays fare

h. S sits or stands (varies)

i. S rings buzzer and goes to a door on cue from driver

j. S gets off.

Phase II: Teaching Ss selected places in the city of Madison, Wisconsin, where food, clothing, opportunities for recreation and other services could be obtained and what bus to take to reach the destination from Capitol Park.

Step 1 - S demonstrates the ability to label 8 "sight words" individually presented (These are words which will appear on individual bus route cards. Each bus route card should be considered a set of 8 words).

Step 2 - S points to the 8 words appearing on the bus route card learned in Step 1 of this phase on cue from T.

Step 3 - S tells T the name of the bus route that would appear on the bus' destination sign when traveling between two points listed on the bus route card.

Step 4 - T asks the S to view a videotape of a bus route and names a destination where S should get off. S responds by throwing a switch which lights a bulb when the appropriate stop flashes on the monitor.

Phase III: Teaching Ss to ride an actual city bus to and from Capitol Park to obtain the food, clothing, recreational opportunities or other services listed on the bus route cards.

Step 1 - Ss choose one of the bus routes they have learned. T chooses the last stop on this route as Ss' destination. Using their bus route cards, Ss determine the name of the route leaving and returning to Capitol Park from the destination chosen. Ss verbally rehearse the stops along this route. They find the proper bus stop at Capitol Square.

Step 2 - Ss, starting at Capitol Park, take the appropriate bus to the destination chosen in Step 1 and return. They travel in a small group with T.

Step 3 - Same as Step 2, except Ss travel without T in a small group.

Step 4 - Same as Step 2, except Ss travel alone.

Step 5 - The Ss perform the prerequisite skills necessary to transfer buses in the classroom.

Step 6 - Using their bus route cards in the classroom Ss gain experience at finding the buses they need to take when transferring.

Step 7 - Ss ride a city bus, traveling in a small group with T, choosing two destinations and transferring to reach them.

Step 8 - Same as Step 7, except Ss travel in a small group without T.

Step 9 - Same as Step 7, except Ss travel alone.

Step 10 - Ss perform the prerequisite skills for taking a city bus from their house to Capitol Park and returning home in the classroom.

Step 11 - S chooses a destination, takes a city bus from his/her home traveling with T to Capitol Park, transfers to the destination and returns home.

Step 12 - Same as Step 11, except S rides alone.

Phase IV: Teaching Ss how to determine what bus to take to places that do not appear on bus route cards.

Step 1 - Teaching Ss to label cards with the names of major streets in the city of Madison (This is done to facilitate labeling addresses in later stages of this phase.).

Step 2 - S looks up one of the streets acquired in Step 1 of this phase in the Street Index on the back of a map of Madison, Wisconsin. He/She then labels the coordinates listed next to the name of the street located.

Step 3 - S gains experience at finding streets on a map of Madison, Wisconsin.

Step 4 - Teaching Ss how to use the Madison Telephone Directory to find addresses and phone numbers of places they would like to go to. S also writes down the address and phone number that he/she finds.

Step 5 - S calls Directory Assistance to find out the phone number of a place he/she has been unable to locate in the phone book. S then calls the number to find the address.

Step 6 - S uses an actual phone to call Directory Assistance to find a phone number. S calls this number and writes down the address.

Step 7 - S finds an exact location on a map of Madison using the numerical component of the address.

Step 8 - S gains experience at finding exact locations on the map.

Step 9 - S is taught the names of various bus routes listed on the map.

Step 10 - S gains experience finding bus routes on the map.

Step 11 - S learns how to find the closest route to a particular street address he/she has located on the front of the map.

Step 12 - S gains experience at finding the appropriate bus route for various addresses using a map of Madison.

Step 13 - S looks up an address in the phone book, locates the closest bus route, and rides the bus to the destination with T and a small group of Ss.

Step 14 - Same as Step 13, except Ss travel in a small group without T.

Step 15 - Same as Step 13, except S travels alone.

## Instructional Program

**Phase I:** Teaching Ss to ride a simulated city bus in the classroom.

**Step 1** - S tells T the differences between a school bus and a city bus and what is meant by the term destination.

**Materials:** No material needed.

**Data Collection:** Whether on baseline or reinforcement, responses 9-13 should be recorded on the data sheet. S's name should appear in the column at the left and the responses for 9-13 should be written in at the top. Criterion, then, for the teaching trials would be the five correct responses in a row for three consecutive trials. Baseline would consist of the presentation of the cues for these five responses for three consecutive trials.

**Sequence of Cues and Responses:**

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "What do you call the bus that takes you to school?" | 1. School bus |
| 2. "Who has ridden on a city bus?" | 2. Various |
| 3. "What's different about a city bus and a school bus?" | 3. Color; pay for city bus, city bus doesn't stop at house. |
| 4. "Who rides the city bus with your parents and/or friends?" | 4. Various |
| 5. "Who rides a city bus by themselves?" | 5. Various |
| (of those who ride the city bus)<br>6. "Where do you go when you ride a city bus?" | 6. Various |
| 7. "How often do you ride a city bus?" | 7. Various |
| 8. "We are going to learn to take a city bus when we want to go somewhere. A place you want to go is called a destination." | 8. No response (R) |

| Teacher's Cues | Student's Responses |
|---|---|
| 9. "When you get on a bus, the place you want to go is called a (__________)." | 9. Destination |
| 10. "If you were home and you wanted to take a bus to the Capitol Park, the Capitol Park would be your (__________)." | 10. Destination |
| 11. "What would be your destination?" | 11. Capitol Park |
| 12. "We are going to learn to take a city bus to a (__________)." | 12. Destination |
| 13. "What is a destination?" | 13. Where you want to go |
| 14. "When we finish, we'll choose a destination, take a city bus there and buy something. But first we'll have to learn what a city bus looks like, where you pay your money, where you sit and when to get off." | 14. No R. |

Step 2 - S labels the various parts of a Madison Metro bus, recognizes a bus stop and demonstrates knowledge of the student fare.

Materials: picture of Madison Metro bus
simulated bus and bus stop
bus route card
money for fare

Data Collection: Whether on baseline or teaching the following responses should be recorded: 1, 3, 4, 6, 8, 10, 17, 19, 21, 25, 27, 28, 36, 38, 42, 44, 45, 46, 49, 55, 56, 57. The S's name should appear in the column at the left and the responses should be written in at the top. Baseline would consist of the presentation of the cues for these 21 responses for three consecutive trials. Criterion, then, for the teaching trials would be the 21 correct responses in a row for three consecutive trials.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. Point to the front of the bus in the picture and say: "This is the (__________) of the bus." | 1. Front |
| 2. Point to the destination sign on the front of the bus and say: "This is a destination sign; it tells you where a bus is going." | 2. No R. |
| 3. Point to the destination sign and say: "What is this sign called?" | 3. Destination sign |
| 4. "What does this sign tell you?" | 4. Where the bus is going |
| 5. "A city bus does not stop at your house. When you want to ride a city bus, you have to walk to a bus stop." | 5. No R. |
| 6. "Where do you walk to if you want to ride a city bus?" | 6. Bus stop |
| 7. Point to bus stop sign in bus mock-up and say: "A bus stop has a sign that looks like this." | 7. No R. |
| 8. "What does this sign say?" | 8. No Parking Bus Stop |
| 9. "At some bus stops they not only have a sign that says, (__________), but they also paint the curbs." | 9. No Parking Bus Stop |
| 10. Point to the simulated curb and say: "They paint the curbs (__________)." | 10. Red and yellow |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 11. | "When you get to a bus stop, you wait right by the bus stop sign until the bus comes. Sometimes a bus will come right away, but sometimes you may have to wait for as long as 20 minutes." | 11. | No R. |
| 12. | "When you take a city bus, where do you walk to?" | 12. | Bus stop |
| 13. | "How do you know when you are at a bus stop?" | 13. | Sign - No Parking Bus Stop and red and yellow curb |
| 14. | "Where do you wait for the bus?" | 14. | At bus stop - next to sign |
| 15. | Displaying the picture of the bus say: "Point to the front door." | 15. | S points to front door in picture. |
| 16. | "Point to the back door." | 16. | S points to back door in picture. |
| 17. | "Do you use the front door or back door to go in the bus?" | 17. | Front door |
| 18. | Point to the back door and say: "Which door is this?" | 18. | Back |
| 19. | Point to the back door and say: "Can you use this door to go in the bus?" | 19. | No |
| 20. | "Which door can you use to go in the bus?" | 20. | Front |
| 21. | "Which doors do you use to get off the bus?" | 21. | Front or back |
| 22. | "Are bus rides free?" | 22. | No |

|  | Teacher's Cues |  | Student's Responses |
|---|---|---|---|
| 23. | "It costs 25¢ for adults and 15¢ for students to ride the bus." | 23. | No R. |
| 24. | "Are you an adult or a student?" | 24. | Student |
| 25. | "How much do you pay to ride the bus?" | 25. | 15¢ |
| 26. | "The money you pay to ride the bus is your fare." | 26. | No R. |
| 27. | "What is the money you pay to ride the bus called?" | 27. | Fare |
| 28. | Hand student a combination of dimes, nickels, quarters and pennies and say: "Take your fare." | 28. | Student takes 15¢ in any combination. |
| 29. | Model other combinations of 15¢, e.g., 3 nickels, one dime and 5 pennies, etc. and say: "You could also use one dime and 5 pennies, etc., to equal your 15¢ fare." | 29. | No R. |
| 30. | "When you ride the bus, you have to have exactly 15¢. If you have more than 15¢ you can't ride the bus, and if you have less than 15¢ you can't ride the bus." | 30. | No R. |
| 31. | "When you leave Badger School next year or two years or three years from now, you won't be a student. You'll be an adult." | 31. | No R. |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 32. | "How much do adults pay to ride the city buses?" | 32. | 25¢ |
| 33. | "How much will you have to pay when you leave Badger School?" | 33. | 25¢ |
| 34. | "But as long as you're at Badger School your fare is (_________)." | 34. | 15¢ |
| 35. | "As soon as you get on the bus you tell the driver where you want to get off; then you pay your fare." | 35. | No R. |
| 36. | "When do you pay your fare?" | 36. | After tell driver where want to get off. |
| 37. | Pointing to the coin box in the bus mock-up say: "This is a fare box; this is where you pay your fare." | 37. | No R. |
| 38. | "What is this called?" | 38. | Fare box |
| 39. | "Where do you pay your fare?" | 39. | Fare box |
| 40. | "When do you pay your fare?" | 40. | After tell driver where want to get off. |
| 41. | Holding up a bus route card say: "Whenever you want to take a bus you must look up your destination on the bus route card." | 41. | No R. |
| 42. | "What is this card called?" | 42. | Bus route card |
| 43. | "If you want to go to McDonald's, you hand the bus driver the bus route card, point to the name McDonald's and say: "Let me off near McDonald's, please." | 43. | No R. |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 44. | "What do you say to the driver when you show him your bus route card?" | 44. | "Let me off near McDonald's, please." |
| 45. | "When do you show the driver the bus route card?" | 45. | As soon as you get on the bus |
| 46. | "When you ride the bus, you tell the driver where you want to get off, pay your fare and then (__________)." | 46. | Sit down |
| 47. | "You should always try to sit close to the driver so he can tell you when to get off." | 47. | No R. |
| 48. | "When you ride a city bus you should (__________)." | 48. | Sit next to the driver |
| 49. | "If there are a lot of people sitting in the bus and there is no seat left for you to sit in, you will have to (__________)." | 49. | Stand up |
| 50. | "When will you have to stand up?" | 50. | When there are no seats left |
| 51. | "If you have to stand up, you should hold on to a seat so that you don't fall down." | 51. | No R. |
| 52. | "If you have to stand up, you should (__________) so you won't fall down." | 52. | Hold on to a seat |
| 53. | "When the bus driver tells you that the next stop is your destination, it's time to get off the bus." | 53. | No R. |

| Teacher's Cues | Student's Responses |
|---|---|
| 54. "When it's time to get off the bus, you should get up and walk to either the front or back door." | 54. No R. |
| 55. "When the driver says that the next stop is your destination, you should (__________)." | 55. Walk to front or back door |
| 56. "When will the driver open the door?" | 56. When bus stops |
| 57. "When the bus driver opens the door you (__________)." | 57. Get off |

Step 3 - S emits the following behaviors in sequence after T's cues have been faded using a simulated Madison Metro bus:

a. S says where he/she wants to go
b. S walks to bus stop
c. S waves the bus to a stop
d. S reads the destination sign on the front of the bus
e. S enters the bus by the front door
f. S hands the driver the bus route card, points to his/her destination and says: "Let me off near __________."
g. S pays fare
h. S sits or stands (varies with condition, 3 trials of each)
i. S rings buzzer and goes to a door on cue from the bus driver
j. S gets off the bus.

Materials: bus and bus stop mock-up
bus route card

Data Collection: Data should be collected for responses 1, 2, 7, 10, 12, 13, 14, 16, 18, 19, 20. Baseline should consist of three trials when there is a seat available on the bus, and three trials when no seats are available and the S must stand. After these trials are completed the teaching trials begin. Criterion here would be three trials of 11 correct responses in a row for standing and three for sitting. Each response should be written across the top of the data sheet with the S's name appearing in the left column.

### Sequence of Cues and Responses:

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 1. | Ask S, "Where do you want to go?" | 1. | McDonald's[4] |
| 2. | T is standing at the simulated bus stop and asks the student to: "Come over and ride the bus." | 2. | S walks to the bus stop |
| 3. | "Where are you?"[5] | 3. | At a bus stop |
| 4. | "How do you know you're at a bus stop?" | 4. | Sign - No Parking Bus Stop and red and yellow curb |
| 5. | "If you are at a bus stop and your bus is coming and you want it to stop so you can get on, you must wave your arm (model) to make sure the driver stops." | 5. | No R. |
| 6. | "What do you do to make sure the bus will stop." | 6. | "..wave your arm.." (verbal R) |
| 7. | "Do it." | 7. | Waves arm |
| 8. | Point to the destination sign on the front of the bus and say: "This is the (________)." | 8. | Destination sign |
| 9. | "It tells you (__________)." | 9. | Where the bus is going |
| 10. | "Where is this bus going?" | 10. | Capitol Park |
| 11. | "What door do you use to go in the bus?" | 11. | Front |
| 12. | "Go in." | 12. | Walks in front door |

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[4] This answer will vary with S, but McDonald's will serve as an example in this step.

[5] Cues 3-18 should be faded.

| Teacher's Cues | Student's Responses |
|---|---|
| 13. "Show the driver your bus route card and point to your destination (the destination is McDonald's)." | 13. Shows driver card and points to McDonald's |
| 14. "When you show the driver your card you say: "(_________)." | 14. "Let me off near McDonald's, please." |
| 15. "After you ask the driver to let you off at your destination, you (_________)." | 15. "..pay your fare." |
| 16. "Pay your fare." | 16. Deposits 15¢ in fare box |
| 17. "What do you do now?" | 17. "Sit down" or "Stand up" (varies with trial) |
| 18. "Do it." | 18. Stands or sits close to driver (varies with trial) |
| 19. Driver says: "Next stop, McDonald's (this cue will not be faded)." | 19. Rings buzzer, gets up and walks to either front or back door. |
| 20. Open front or back door where student is waiting. | 20. Walks out |

Phase II: Teaching Ss selected places in the city of Madison, Wisconsin, where food, clothing, opportunities for recreation and other services could be obtained and what bus to take to reach the destination from the Capitol Park.

Step 1 - S demonstrates the ability to label eight "sight words," individually presented (Sight words by category are listed in Appendix I and II. These are words which will appear on individual bus route cards. Each card should be considered a set of eight words.[6]).

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[6] The words that appear in Appendix I and II correspond to destinations along bus routes in Madison, Wisconsin. Ts interested in implementing this step of the program would, of course, need to make up lists of destinations which correspond to places along bus routes in his or her town.

**Materials:** Each of the eight words that appear on a bus route card are printed individually on an index card.

**Data Collection:** Record S's response to cue 2 for each "sight word" presented. Each response should be written across the top of the data sheet with S's name at the left. Baseline would consist of three presentations of all eight cards. Criterion for the teaching trials would be eight correct responses in a row for three trials.

**Sequence of Cues and Responses:**

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "On each of these cards is printed the name of a place you can go to or the name of a bus that will take you to places in Madison. We're going to learn the names of each of these places." | 1. No R. |
| 2. T holds up card with word printed on it (e.g., McDonald's) and says: "Read the card." | 2. Labels word |
| 3. Repeat cue 2 for each card to be taught. | 3. Labels words |
| 4. After S reaches criterion on the set of eight cards, explain to S what each place is, what can be purchased there, etc. | 4. No R. |

**Step 2** - S points to the eight words appearing on the bus route card learned in Step 1 on cue from T.

**Materials:** Bus route card

**Data Collection:** Print the eight words across the top of the data sheet and record S's responses to cue 6. Three trials, asking S to point to and label the eight words to only cue 6, would comprise the baseline phase. Criterion for teaching would be 100% correct responses for three consecutive trials.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. Give each S a printed bus route card (see list at end) and say: "This card is called a bus route card." | 1. No R. |
| 2. "What is this card called?" | 2. Bus route card |
| 3. "This is the bus route card for the (add route name, e.g., Johnson St./Nakoma Rd.) bus route." | 3. No R. |
| 4. "Which bus route is this?" | 4. e.g., Johnson St./ Nakoma Rd. |
| 5. "There are six places you can go to on the bus written on the card. There are also the two names for the bus route. Depending upon which way you are going, the destination sign on the bus will read (e.g., Johnson St.) or (e.g., Nakoma Rd.)." | 5. No R. |
| 6. Randomly ask S to point to one of the six places to go to or one of the two bus route names until S has responded to all eight items on the card. | 6. Points to appropriate word on cue from T. |

Step 3 - S tells T the name of the bus route that would appear on the bus destination sign when travelling between two points listed on the bus route cards.

Materials: Bus route cards

Data Collection: The ten combinations of destinations with the appropriate bus route name should be written at the top of the data sheet. S's responses to cue 11 should be recorded under these headings. Baseline would consist of three presentations of these ten combinations to cue 11 alone.

If S gets all ten correct for three consecutive presentations, he/she has reached criterion for the teaching trials. Data should be taken whether or not cues 7-10 have been faded. If the objective is to teach S to use these cards independently of T, fading these cues must be an added contingency for the criterion during the teaching trials.

Sequence of Cues and Responses:

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 1. | Give S a bus route card and say in reference to the name of the bus route written at the top: "What color is the name (e.g., Johnson St.)?" | 1. | Green (Note - the route at the top of the card will always be green.) |
| 2. | "Does the green arrow (See route cards at end) point up or down?" | 2. | Down (Note - the green arrow will point down on all the bus route cards.) |
| 3. | "What color is the name (e.g., Nakoma Rd.)?" | 3. | Red (Note - the bottom route will always be red.) |
| 4. | "Does the red arrow (See route card at end) point up or down?" | 4. | Up (Note - red arrow will always point up.) |
| 5. | "Let's say that you're at (e.g., Capitol Park, any place listed on bus route card); point to it." | 5. | S points as cued |
| 6. | "...and you want to go to (e.g., East Towne Mall, any place other than that in #5); move that same finger until you come to (e.g., East Towne Mall)." | 6. | S moves finger as cued |
| 7. | "Are you reading up or down?"[7] | 7. | Down or up, depends upon places chosen; |

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[7] Cues 7-10 should be faded.

| Teacher's Cues | Student's Responses |
|---|---|
|  | the response would be down in the example. |
| 8. "Which colored arrow points (either up or down, depending upon choices in #5 and 6)?" | 8. Red or green, depends upon places chosen. |
| 9. "Put your finger on the (e.g., green, depends on places chosen) arrow." | 9. S puts finger on the tip of appropriate arrow. |
| 10. "Now follow that arrow back until you come to the (e.g., green) bus route name." | 10. S moves finger back as cued. |
| 11. "What would be the name of the destination sign on the bus?" | 11. e.g., Johnson St.; depends upon places chosen. |
| 12. Repeat the above cues 5-11 until S has responded to ten combinations of places to go for each of the two bus route names. | 12. Various |

Note: After teaching S a particular bus route with Steps 1-3, start back at Step 1 with another bus route until all eight bus routes have been taught.

Step 4 - This step involves the use of videotapes to present a simulated bus ride. Each tape was made while riding in a car, travelling the exact route a bus would take. During the course of the taping the camera would focus in on the bus' destination sign and the five destinations that appeared on the bus route card. Since travelling a bus route one way involves a fifteen to thirty minute ride, the tapes were edited to increase their usefulness in the classroom. The essential setting surrounding each destination was kept intact along with some of the rides between stops. It was felt that the final tapes presented the salient cues of the routes while successfully eliminating some of the boredom that might have resulted from presenting an exact mirror image of the route to S.

In the teaching sessions T told S where, during the taped ride, he/she should get off the bus. S responded by throwing a switch which turned on a light. A correct response entailed turning on the light as the destination cued by T flashed across the monitor.

**Materials:** videotapes of the bus routes
videotape recorder with monitor
desk with portable switch and light bulb placed on top
appropriate bus route cards

**Data Collection:** The names of the five destinations which appear on S's bus route card for the route being viewed should be written across the top of the data sheet in random order. S's responses to cue 10 should be recorded under the appropriate destinations. Baseline would consist of three presentations of a tape for each of the five destinations. If S gets all five correct for three consecutive presentations, he/she has reached criterion for the teaching trials. Cues 1-8 should be faded.

**Sequence of Cues and Responses:**

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "We are going to look at a movie of the Johnson St./Nakoma Rd.[8] bus route on T.V." | 1. No R. |
| 2. "What bus route are we going to see on T.V.?" | 2. Johnson St./Nakoma Rd. |
| 3. "Let's look at the movie (T shows videotape)." | 3. S views T.V. |
| 4. T hands S the appropriate bus route card and says, "What bus route card is this?" | 4. Johnson St./Nakoma Rd. |
| 5. "What bus route are we going to see in the movie?" | 5. Johnson St./Nakoma Rd. |
| 6. "From now on when I show you the movie, I'm going to ask you to get off the bus at one of the destinations | 6. No R. |

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[8] The Johnson St./Nakoma Rd. bus route will be used as an example throughout the teaching steps.

| Teacher's Cues | Student's Responses |
|---|---|
| printed on the Johnson St./Nakoma Rd. bus route card." | |
| 7. "When you see the destination in the movie, it will be time to get off the bus. You can show me when you should get off the bus by flipping this switch (T demonstrates)." | 7. No R. |
| 8. "Flip the switch to see how it works." | 8. S flips switch. |
| 9. "You're at Capitol Park, and you want to get off at Tenney Park. What would be the destination sign on the bus?" | 9. Johnson St. |
| 10. "Watch the movie and get off at Tenney Park. When you see Tenney Park, flip the switch to show me where you want to get off." | 10. S flips switch and lights bulb when Tenney Park appears on the monitor. |

Note: Repeat this sequence showing both directions of each bus route to be taught.

Phase III: Teaching Ss to ride an actual city bus to and from Capitol Park to obtain the food, clothing, recreational opportunities or other services listed on the bus route cards.

Step 1 - Ss chose one of the bus routes they have learned. T chooses the last stop on this bus route card as Ss' destination. Using their bus route cards Ss determine the name of the route leaving Capitol Park and going to their destination. They also determine the route coming back to Capitol Park. Ss verbally rehearse the stops along the route they have chosen. This section also functions as a review of the procedure for riding a bus with the inclusion of additional information needed to find the proper bus stop at Capitol Square.

Materials: Bus route cards

Data Collection: This step is used to foreshadow the bus ride on the following day. Because of this all Ss' responses required in this step will have been acquired in previous phases. There is only one new response to be learned; the response to cue 13. Data need only be taken for this response in this step. Baseline would be three presentations of this question as it occurs in sequence with the rest of the cues in this step. The teaching criterion would be simply three correct responses in a row to cue 13.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "We're going to go out and ride a real city bus tomorrow. I would like you to choose a bus route to go on." | 1. No R. |
| 2. "What bus route would you like to ride?" | 2. Ss name route - choose route that most want to go on. |
| 3. "We are going to start out at the Capitol Park and go to East Towne Mall. When we're at East Towne Mall, we can buy a record to use at school. Each of you will ride the bus with one teacher and two other students."[9] | 3. No R. |
| 4. Give S a Johnson St./Nakoma Rd. bus route card.[10] | 4. No R. |
| 5. "What is the name of the bus route at the top of the card?" | 5. Johnson St. |

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[9] The Johnson St./Nakoma Rd. bus route will be used as an example.

[10] Cues 4-13 are a modified version of Step 3 of Phase II.

| Teacher's Cues | Student's Responses |
|---|---|
| 6. "What is the name of the bus route at the bottom of the card?" | 6. Nakoma Rd. |
| 7. "(S's name), you will be at the Capitol Park and you will want to go to East Towne Mall. What will be the destination sign on the bus?" | 7. Johnson St. |
| 8. "(S's name), when you get to East Towne Mall, we'll get off the bus and buy a record. Then we will have to come back to the Capitol Park." | 8. No R. |
| 9. "(S's name), you will be at East Towne Mall, and you will want to go to the Capitol Park. What will be the destination sign on the bus?" | 9. Nakoma Rd. |
| 10. "Now when we're at the Capitol Park, what's the first thing we will have to do in order to ride the bus?" | 10. Walk to a bus stop |
| 11. "How do you know when you're at a bus stop?" | 11. Sign - No Parking Bus Stop and red and yellow curb |
| 12. "At the Capitol Park the bus stops not only have red and yellow curbs and a sign that says No Parking Bus Stop, but they also have another sign that will have the names of the buses that stop there." | 12. No R. |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 13. | "So if you are at the Capitol Park and you want to take the Johnson St. bus, you would have to walk to a bus stop with a red and yellow curb, a sign that says, *No Parking Bus Stop* and a sign under that that says (_________)." | 13. | Johnson St. |
| 14. | "Tell me what you do when you get on the bus."[11] | 14. | a. Wave bus to stop.<br>b. Go in front door.<br>c. Show driver route card<br>d. "Let me off at East Towne Mall, etc."<br>e. Pay fare - 15¢<br>f. Sit down<br>g. Rings buzzer and goes to door when driver says, "Next stop, East Towne Mall, etc."<br>h. Get off |
| 15. | "Look at your bus route cards. If you are on the Johnson St. bus travelling to East Towne Mall, what will be the first place you will see after you leave the Capitol Park?" | 15. | Tenney Park |
| 16. | "What will be next?" | 16. | East High School |
| 17. | "... next?" | 17. | McDonald's |
| 18. | "... next?" | 18. | Shakey's Pizza |
| 19. | "... next?" | 19. | East Towne Mall |

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[11] Prompt responses *Ss* fail to make.

| Teacher's Cues | Student's Responses |
|---|---|
| 20. "When you are travelling back to the Capitol Park from East Towne Mall, what will be the first stop you will see?" | 20. Shakey's Pizza |
| 21. "... next?" | 21. McDonald's |
| 22. "... next?" | 22. East High School |
| 23. "... next?" | 23. Tenney Park |
| 24. "... next?" | 24. Capitol Park |

Step 2 - Ss, starting out at Capitol Park, take the appropriate bus to the destination chosen in Step 1 of this phase. They travel in a small group with T. T insures that each S recognizes each of the five stops listed on their bus route card as they pass them. While at their destination, Ss perform the behaviors required by the place they have travelled to (e.g., if they go to East Towne Mall, they could make a small purchase). Ss then take the appropriate bus back to Capitol Park. T again makes sure that Ss recognize the five stops along the way.

Materials: Appropriate bus route card

Data Collection: Since the final goal is to teach Ss to independently ride the bus and due to the difficulties in collecting data in this situation, data will only be collected in Step 4 when S rides the bus alone.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. After Ss arrive at the Capitol Park with the Johnson St./Nakoma Rd. bus route card, T says: "We're at the Capitol Park and we want to go to East Towne Mall. What will be the destination sign on the bus?"[12] | 1. Johnson St. |

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[12] The Johnson St./Nakoma Rd. card will again serve as an example in this section.

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 2. | "In order to catch the Johnson St. bus, first we have to walk to a (_________)." | 2. | Bus stop |
| 3. | "How do we know when we're at the right bus stop?" | 3. | Sign - No Parking Bus Stop; Sign - Johnson St. and red and yellow curb |
| 4. | "Find a bus stop where you can catch the Johnson St. bus." | 4. | Ss find Johnson St. bus stop. |
| 5. | "We'll wait here until the bus comes with Johnson St. as the destination sign; then we'll get on." | 5. | Ss wait |
| 6. | Johnson St. bus arrives (no cue from T). | 6. | Ss get on front door. |
| 7. | Sight of driver (no cue from T). | 7. | S hands bus driver route card, points to East Towne Mall and says: "Let me off near East Towne Mall." |
| 8. | Sight of fare box (no cue from T). | 8. | S pays 15¢ fare in fare box. |
| 9. | Sight of seats (no cue from T). | 9. | S sits down. |
| 10. | "Look at your bus route cards. What's the first place we will pass?" | 10. | Tenney Park. |
| 11. | "Watch for Tenney Park." | 11. | S watches. |
| 12. | If Ss do not recognize Tenney Park as the bus approaches, say: "What's that place to your left?" | 12. | Tenney Park |

| Teacher's Cues | Student's Responses |
|---|---|
| 23. Sight of driver (no cue from T). | 23. S hands bus driver route card, points to Capitol Park and says: "Let me off near the Capitol Park." |
| 24. Sight of fare box (no cue from T). | 24. S pays 15¢ fare in fare box. |
| 25. Sight of seats (no cue from T). | 25. S sits down. |
| 26. "Look at your bus route cards. What's the first place we will pass?" | 26. Shakey's Pizza |
| 27. "Watch for Shakey's Pizza." | 27. S watches. |
| 28. If S does not recognize Shakey's Pizza as the bus approaches, say: "What's that place to your left?" | 28. Shakey's Pizza |
| 29. Repeat cues 27 and 28 substituting the names of the remaining four stops (McDonalds, East High School, Tenney Park, Capitol Park). | 29. Various places listed on route cards. |
| 30. On the cue from the bus driver, "Next stop, Capitol Park..." (T supplies cue if driver fails to). | 30. S rings buzzer and walks to either front or back door and gets off when bus stops. |

Step 3 - Ss, starting out at Capitol Park, take the appropriate bus to the destination chosen in Step 1 of this phase. They travel in a small group without a teacher. While at their destination Ss perform the behaviors required by the place they have travelled to (e.g., if they go to East Towne Mall, they could make a small purchase). Ss then take the appropriate bus back to the Capitol Park.

**Materials:** Appropriate bus route card

**Data Collection:** No data collected during this step.

**Sequence of Cues and Responses:**

| Teacher's Cues | Student's Responses |
|---|---|
| 1. After Ss arrive at the Capitol Park with the Johnson St./Nakoma Rd. bus route card, T says: "We're at the Capitol Park and we want to go to East Towne Mall. What will be the destination sign on the bus?"[13] | 1. Johnson St. |
| 2. "In order to catch the Johnson St. bus, first we have to walk to a (__________)." | 2. Bus stop |
| 3. "How do we know when we're at the right bus stop?" | 3. Sign - No Parking Bus Stop; Sign - Johnson St. and red and yellow curb |
| 4. "Find a bus stop where you can catch the Johnson St. bus. When the Johnson St. bus comes, take it to East Towne Mall. After you get off at East Towne Mall, look for (T's name). T's name will take you to buy a record. (T then leaves Ss and observes from a distance)." | 4. S finds Johnson St. bus stop and gets on the first Johnson St. bus. |
| 5. Sight of Johnson St. bus (no cue from T). | 5. S gets on front door, shows route card, pays fare, sits down. |

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[13] The Johnson St./Nakoma Rd. card will serve as an example in this section.

| Teacher's Cues | Student's Responses |
|---|---|
| 6. Sight of bus stop at East Towne Mall; T stays hidden so that S does not respond to T's presence as cue to get off. | 6. S gets off. |
| 7. T takes Ss to make a purchase. | 7. Various |
| 8. "Take out your bus route cards." | 8. S takes out card. |
| 9. "You're at East Towne Mall, and you want to go to the Capitol Park. What will be the destination sign on the bus?" | 9. Nakoma Rd. |
| 10. "If you want to take the Nakoma Rd. bus back to the Capitol Park, first we have to walk to a (__________)." | 10. Bus stop |
| 11. "Find a bus stop. When the Nakoma Rd. bus comes, take it to the Capitol Park. Get off at the first bus stop at the Capitol Park." | 11. S goes to bus stop. |
| 12. Sight of Nakoma Rd. bus (no cue from T). | 12. S gets on front door, shows route card, pays fare, sits down. |
| 13. Sight of first stop at Capitol Park; T stays hidden. | 13. S gets off. |

Step 4 - S, starting out at Capitol Park, takes the appropriate bus to the destination chosen in Step 1 of this phase. S travels alone. While at his/her destination, S performs the behaviors required by the place he/she has travelled to (e.g., if S goes to East Towne Mall, he/she could make a purchase). S then takes the appropriate bus to the Capitol Park.

Materials: Appropriate bus route card

Data Collection: The responses to cues 4-6 and 11-13 should be written at the top of the data sheet with S's name at the left side. Data should be collected for these responses. Since S will gain practice at riding all eight bus routes alone, the criterion for each route will be only one perfect trial. Because of the two previous steps and the difficulty in separating the generalization effects from those situations, baseline information will not be taken.

Procedure: The occurrence of behaviors 1-6 and 8-13 should be recorded. Each correct response should be followed by praise, except when S enters the bus. In these cases T should praise when S gets off at the appropriate stop.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|

Cues 1-13 in Step 3 of this phase should be used. Repeat Steps 1-4 until each bus route has been taught. After each route is learned, then move on to Step 5.

Step 5 - During this step Ss learn how to transfer buses. They choose two of the bus routes they have learned. T chooses one place on each card as destinations. Using their bus route cards Ss determine the name of the route leaving Capitol Park and going to each of the two destinations. They also determine the routes coming back to Capitol Park. This section functions as a review of the procedure for riding a bus with the inclusion of additional information needed to transfer from one route to another.

Materials: Appropriate bus route cards

Data Collection: Data should be collected for the following responses: 5, 9, 10, 11, 12, 13, 15, 17, 19, 20, 23, 24, 26. Each response should be listed across the top of the data sheet with S's name at the left. Baseline will consist of three presentations of the 13 cues appropriate to the responses listed above. Criterion for teaching would be three trials of the 13 correct responses in a row.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. We're going to go out and ride a city bus tomorrow, and we're going to learn how to transfer buses. I'd like you to choose two bus routes to go on." | 1. No R. |
| 2. "What bus routes would you like to ride?"[14] | 2. S names two routes, e.g., Johnson St./ Nakoma Rd., and Highland Park/Sherman Ave. |
| 3. "We are going to start out at the Capitol Park and go to McDonald's for lunch. Then we are going to go back to the Capitol Park and transfer to the bus that takes us to PDQ Grocery Store. We'll buy some Coke at PDQ to bring back to class and then take the bus back to the Capitol Park." | 3. No R. |
| 4. Give Ss both bus route cards. | 4. S takes cards. |
| 5. "(S's name), you will be at the Capitol Park, and you will want to go to McDonald's for lunch. What will be the destination sign on the bus?" | 5. Johnson St. |
| 6. "When you get to McDonald's, you'll have your lunch; then you will want to go to PDQ Grocery Store to buy some Coke to bring to class." | 6. No R. |

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[14] The Johnson St./Nakoma Rd. and Highland Park/Sherman Ave. bus routes will serve as examples in this step.

| Teacher's Cues | Student's Responses |
|---|---|
| 7. "In order to get to PDQ Grocery Store you will have to take one bus to the Capitol Park and then transfer to the bus that goes to PDQ." | 7. No R. |
| 8. "To transfer means to change buses to get to your destination." | 8. No R. |
| 9. "What does transfer mean?" | 9. To change buses to get to your destination. |
| 10. "Now you will be at McDonald's, and you want to go to PDQ Grocery Store to buy some Coke. First you will have to take a bus to the (_________)." | 10. Capitol Park |
| 11. "Then you have to (_________) buses." | 11. Transfer |
| 12. "You will be at the Capitol Park, and you want to go to PDQ Grocery Store to buy some Coke. What will be the destination sign on the bus you transfer to?" | 12. Highland Park |
| 13. "After you buy the Coke at PDQ, you will want to go back to the Capitol Park. What will be the destination sign on the bus?" | 13. Sherman Ave. |
| 14. "Whenever you get on a city bus and you need to transfer to another bus, you should ask the bus driver for a transfer right after you pay your fare." | 14. No R. |

| Teacher's Cues | Student's Responses |
|---|---|
| 15. "When should you ask the bus driver for a transfer?" | 15. Right after pay fare, when need to change to a second bus. |
| 16. "A transfer is a small piece of paper with printing on it that looks like this (demonstrate)." | 16. No R. |
| 17. Hold up transfer and say: "What is this?" | 17. Transfer |
| 18. "When you transfer from one bus to another bus, all you have to do is give the bus driver this (show transfer), a transfer. You won't have to pay the 15¢ fare to ride the second bus if you have a transfer." | 18. No R. |
| 19. "Do you have to pay the 15¢ fave to ride the second bus if you have a transfer?" | 19. No |
| 20. "What do you do instead of paying the fare when you ride the second bus?" | 20. Give bus driver the transfer. |
| 21. "Tomorrow when you're at Capitol Park and you want to go to McDonald's, will you have to ask the bus driver for a transfer?" | 21. No |
| 22. "Right, because you will only be taking one bus to get to McDonald's." | 22. No R. |
| 23. "But when you finish eating at McDonald's and you want to go to PDQ Grocery Store to | 23. Yes |

| Teacher's Cues | | Student's Responses |
|---|---|---|
| | buy some Coke, will you have to ask the bus driver for a transfer?" | |
| 24. | "You will have to ask the driver for a transfer because you need to take (__________) buses to get to PDQ." | 24. Two |
| 25. | "Will you have to pay the 15¢ fare to ride the second bus to PDQ Grocery Store?" | 25. No |
| 26. | "You will have to give the bus driver a (__________) to ride the bus to PDQ Grocery Store." | 26. Transfer |

Step 6 - Using their bus route cards Ss gain experience in the classroom at finding the buses they need to take when transferring.

Materials: Appropriate bus route cards

Data Collection: Responses 2-5 should be written across the top of the data sheet. Baseline consists of three trials where the cues for these responses are presented. Criterion for the teaching trials would be S emitting the four correct responses for three consecutive trials.

Sequence of Cues and Responses:

| Teacher's Cues | | Student's Responses |
|---|---|---|
| 1. | T hands out two different bus route cards and says: "What bus routes are these?"[15] | 1. Johnson St.<br>Highland Park |
| 2. | "You're at East Towne Mall and you want to go to PDQ Grocery Store. First you have to go to the (__________)." | 2. Capitol Park |

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[15] Johnson St. and Highland Park will serve as examples.

| Teacher's Cues | Student's Responses |
|---|---|
| 3. "What would be the destination sign on the first bus?" | 3. Nakoma Rd. |
| 4. "Now you're at the Capitol Park and you have to transfer buses to go to PDQ Grocery Store. What would be the destination sign on the second bus?" | 4. Highland Park |
| 5. "You're at PDQ Grocery Store and you want to go back to the Capitol Park. What would be the destination sign on the bus?" | 5. Sherman Ave. |

Repeat cues 1-5 until S has reached criterion for ten random combinations of destinations on the two bus route cards. Then move on to two different bus route cards. Repeat this procedure until Ss have had trials with destinations from all the bus route cards.

Step 7 - Ss, starting out at Capitol Park, take the appropriate bus to the first destination chosen in Step 5 of this phase. They travel in a small group with T. While at their destination Ss perform the behaviors required by the place they have travelled to (e.g., if they go to McDonald's, they eat). Ss then take the appropriate bus back to Capitol Park where they transfer to the bus they need to take to the second destination chosen in Step 5. Ss perform the behaviors required by the second place they have travelled to (e.g., if they go to PDQ Grocery Store, they buy something). After they are finished, they travel back to Capitol Park.

Materials: Appropriate bus route cards

Data Collection: No data collected during this step.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. After Ss arrive at Capitol Park with the two bus route cards T says: "You're at the | 1. Johnson St. |

| Teacher's Cues | Student's Responses |
|---|---|
| Capitol Park and you want to go to McDonald's for lunch. What would be the destination sign on the bus?"[16] | |
| 2. "When we want to take a bus, first we have to find the right bus stop." | 2. No R. |
| 3. "Go find the Johnson St. bus stop and wait for the Johnson St. bus." | 3. *S* finds bus stop and waits. |
| 4. Sight of bus (no cue from *T*). | 4. *S* enters front door; shows driver route card and says: "Let me off near McDonald's."; pays fare; sits down. |
| 5. Sight of McDonald's; driver: "Next stop, McDonald's." | 5. *S* rings buzzer and goes to back door. |
| 6. Door opens (no cue from *T*). | 6. *S* gets off. |
| 7. "Let's have lunch (i.e., whatever is required by destination)." | 7. *S* eats lunch, etc. |
| 8. After lunch *T* says: "You're at McDonald's and you want to go to PDQ Grocery Store to buy some Coke to bring back to class." | 8. No R. |
| 9. "In order to get to PDQ you will have to (__________) Buses." | 9. Transfer |

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[16] The Johnson St./Nakoma Rd. and Highland Park/Sherman Ave. bus routes will be used as examples in this step.

|  | Teacher's Cues |  | Student's Responses |
|---|---|---|---|
| 10. | "So you're at McDonald's and you want to go to PDQ Grocery Store to buy some Coke. First you will have to go to the (__________)." | 10. | Capitol Park |
| 11. | "You're at McDonald's. To go to the Capitol Park you have to take the (__________) bus." | 11. | Nakoma Rd. |
| 12. | "You will be at the Capitol Park and you want to go to PDQ Grocery Store to buy some Coke. What will be the destination sign on the bus you transfer to?" | 12. | Highland Park |
| 13. | "In order to catch the Highland Park bus at the Capitol Square you will have to walk to a (__________)..." | 13. | Bus stop |
| 14. | "...with two signs that say (__________) and (__________)." | 14. | No Parking Bus Stop<br>Highland Park |
| 15. | "Since you have to transfer buses at the Capitol Park, when you get on the Nakoma Rd. bus you must ask the driver for a (__________)." | 15. | Transfer |
| 16. | "When you get on the Highland Park bus at the Capitol Square, do you have to pay the 15¢ fare?" | 16. | No |
| 17. | "You give the bus driver a (__________)." | 17. | Transfer |
| 18. | "You're at McDonald's and you want to go to PDQ Grocery Store." | 18. | No R. |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 19. | "First you walk to a (__________)." | 19. | Bus stop |
| 20. | "You wait for the (__________) bus." | 20. | Nakoma Rd. |
| 21. | "When you get on the Nakoma Rd. bus, after you pay your fare, you ask for a (__________)." | 21. | Transfer |
| 22. | "When you come to the Capitol Park you (__________)." | 22. | Get off bus |
| 23. | "Then you have to transfer to the (__________) bus." | 23. | Highland Park |
| 24. | "To catch the Highland Park bus you have to walk to a (__________) with two signs that say: (__________) and (__________)." | 24. | Bus stop; No Parking Bus Stop; Highland Park |
| 25. | "When you get on the Highland Park bus, you don't have to pay the fare. You hand the driver the (__________)." | 25. | Transfer |
| 26. | "Find a bus stop, take the Nakoma Rd. bus to the Capitol Park; find the Highland Park bus stop and transfer to go to PDQ." | 26. | S responds as directed. |

Step 8 - Ss, starting out at Capitol Park, take the appropriate bus to the first destination chosen in Step 5 of this phase. They travel in a small group without T. While at their destination Ss then take the appropriate bus back to Capitol Park where they transfer to the bus they need to take to the second destination chosen in Step 5. Ss perform the behaviors required by the place they have travelled to. After they are finished they travel back to Capitol Park.

Materials: Appropriate bus route cards

Data Collection: No data collected during this step.

Sequence of Cues and Responses:

Teacher's Cues    Student's Responses

Repeat cues 1-26 that appear in Step 7 of this phase. T should stay hidden as Ss get on or off a bus and should come out to greet them after they get off.

Step 9 - S, starting out at Capitol Park, takes the appropriate bus to the first destination chosen in Step 5 of this phase. S travels alone. While at his/her destination S performs the behaviors required by the place travelled to. S then takes the appropriate bus back to Capitol Park where he/she transfers to the bus needed to reach the second destination. S performs the behaviors required by the place travelled to and returns to Capitol Park.

Materials: Appropriate bus route cards

Data Collection: Record only S's responses to cue 26 appearing in Step 7. No baseline data will be taken, and criterion for the teaching trials will be one perfect trial.

Sequence of Cues and Responses:

Teacher's Cues    Student's Responses

Repeat cues 1-26 that appear in Step 7 of this phase. After S has reached criterion in this step, repeat Steps 7-9 until S has transferred using each bus route.

Step 10 - Since all city buses originate at Capitol Park, S learns how to take a city bus from the vicinity of his/her house to Capitol Park and return home.

Materials: S's own "home-bus-route card" (See Appendix II, e for example).

Data Collection: The responses for cues 29-34 should be written across the top of the data sheet with S's name in the left column. Baseline would consist of three presentations of cues 29-34 in sequence as they occur in this step. Criterion for the teaching trials would be six correct responses to these cues in a row for three consecutive trials.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "Whenever you are home and you want to take a city bus to go some place, for example, McDonald's, you will first have to take a bus from your house to Capitol Park. Sometimes when you arrive at the Capitol Park, you will have to transfer to another bus to go to your destination. And sometimes the place you want to go to will be on the same bus route you would take to go to the Capitol Park." | 1. No R. |
| 2. "When you are home and you want to take a city bus to go some place, you have to first take a bus to (__________)." | 2. Capitol Park |
| 3. "When you arrive at the Capitol Park, sometimes you will have to (__________) buses." | 3. Transfer |
| 4. "And sometimes the place you want to go to will be on the (__________) bus you take to the Capitol Park." | 4. Same |
| 5. "(S's name), where do you live?" | 5. S's address |
| 6. "The first thing you do when you want to take a city bus is walk to a (__________)." | 6. Bus stop |

| Teacher's Cues | Student's Responses |
|---|---|
| 7. "How do you know when you're at a bus stop?" | 7. Sign - No Parking Bus Stop; red and yellow curb |
| 8. "S's name, when you want to go to the Capitol Park to catch a bus you should walk to the bus stop at the corner (if corner applies) of (__________) (St./Ave.) and (__________) (St./Ave.)." | 8. No R. |
| 9. "When you want to go to the Capitol Park, your bus stop is at the corner of (__________) (St./Ave.) and (__________) (St./Ave.)." | 9. __________(St./Ave.) and<br>__________(St./Ave.) |
| 10. "The destination sign on the bus that you take is (route that applies)." | 10. No R. |
| 11. "When you want to go to the Capitol Park, you walk to the bus stop at the corner of (__________) (St./Ave.) and (__________) (St./Ave.)." | 11. __________(St./Ave.) and<br>__________(St./Ave.) |
| 12. "And you wait for the (__________) bus." | 12. Bus route name |
| 13. "When you get home tonight, ask your parents to walk with you to the bus stop at the corner of (__________) (St./Ave.) and (__________) (St./Ave.)." | 13. No R. |
| 14. "When you arrive at the Capitol Park, you may have to transfer to get | 14. Transfer |

| Teacher's Cues | Student's Responses |
|---|---|
| to your destination. If you do, when you get on the bus at your house to come to the Capitol Park, you should ask the driver for a (__________)." | |
| 15. "When you get to the Capitol Park, get off the bus and transfer to the next bus going to your destination. If you don't have to transfer, stay on the bus until you reach your destination." | 15. No R. |
| 16. "When you want to go back home, you will have to take a bus to the Capitol Park and transfer to the bus that goes to your house. But sometimes the bus you take back from your destination will be the same one that goes to your house." | 16. No R. |
| 17. "S's name, the route that you take to go home is (route that applies)." | 17. No R. |
| 18. "What route do you take home from the Capitol Park?" | 18. Route name that applies |
| 19. "When you are at the Capitol Park and you have to transfer to the (route name) bus, you will have to walk to a (__________)." | 19. Bus stop |
| 20. "How do you know that you're at the right bus stop?" | 20. Sign - No Parking Bus Stop; Sign - Bus route name |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 21. | "S's name, the bus stop where you get off to walk to your house is at the corner of (__________) (St./Ave.) and (__________) (St./Ave.)." | 21. | No R. |
| 22. | "When you want to go home from the Capitol Park, you take the (bus route name) bus, and you get off at the corner of (__________) (St./Ave.) and (__________) (St./Ave.)." | 22. | Bus route name<br>__________(St./Ave.)<br>__________(St./Ave.) |
| 23. | Ask your parents tonight to show you the bus stop at the corner of (__________) (St./Ave.) and (__________) (St./Ave.), the place where you get off the bus when you're coming home from the Capitol Park. | 23. | No R. |
| 24. | T hands S new bus route card to be used for trips from the Capitol Park to S's house and says: "This bus route card tells you the destination sign on the bus when you are going from your house to the Capitol Park and back to your house. | 24. | No R. |
| 25. | "What is the name of the bus route at the top of the card?" | 25. | __________(St./Ave.) |
| 26. | "What is the name of the bus route at the bottom?" | 26. | __________(St./Ave.) |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 27. | "This card also tells you the corner where the bus stop is when you are going to the Capitol Park." | 27. | No R. |
| 28. | T points to the name at the top of the card and says: "When you are going to the Capitol Park, you catch the bus at the corner of [illegible]______) (St./Ave.) and (______) (St./Ave.)." | 28. | ______(St./Ave.)<br>______(St./Ave.) |
| 29. | T points to the name of the bus stop at the bottom of the card and says: "When you are coming home from the Capitol Park, you get off at the corner of (______) (St./Ave.) and (______) (St./Ave.)." | 29. | ______(St./Ave.)<br>______(St./Ave.) |
| 30. | "You're at S's address and you want to go to the Capitol Park. What would be the destination sign on the bus?" | 30. | bus route at top of card (St./Ave.) |
| 31. | "Where would the bus stop be where you catch the bus route at top (St./Ave.) bus?" | 31. | ______(St./Ave.)<br>______(St./Ave.) |
| 32. | "You're at the Capitol Park and you want to go to your home, S's address. What would be the destination sign on the bus?" | 32. | bus route at bottom of card (St./Ave.) |
| 33. | "What would be the bus stop where you get off the bus route at bottom (St./Ave.) bus?" | 33. | ______(St./Ave.)<br>______(St./Ave.) |

Step 11 - S chooses a destination, starts out from his/her house with T, transfers at the Capitol Park and arrives at the destination. S performs the behaviors required by the place he/she has travelled to. S then returns home, transferring at the Capitol Park.

Materials: S's "home-bus-route-card"
Route card appropriate to the destination

Data Collection: No data collected.

Sequence of Cues and Responses:

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 1. | T arrives at S's house and says: "I have two tickets to the football game at Camp Randall Stadium. Would you like to go? (This is an example)." | 1. | Yes (hopefully) |
| 2. | "Take out all your bus route cards." | 2. | S complies. |
| 3. | "Find the bus route that stops at Camp Randall Stadium." | 3. | S locates Nakoma Rd./ Johnson St. route card. |
| 4. | "In order to go to Camp Randall Stadium, you will have to take a bus from your house to (__________) and (__________) buses." | 4. | Capitol Park transfer |
| 5. | "Take out the bus route card that tells you what bus to take to the Capitol Park from your house." | 5. | S complies. |
| 6. | "You're at home, S's address, and you want to go to the Capitol Park. What will be the destination sign on the bus?" | 6. | S labels St./Ave. listed on "home - bus - route card." |
| 7. | "What corner will you catch the bus at?" | 7. | __________(St./Ave.)<br>__________(St./Ave.) |

| Teacher's Cues | Student's Responses |
|---|---|
| 8. After you get on the bus and pay the fare you ask for (__________)." | 8. Transfer |
| 9. "Once you get to the Capitol Park you will want to transfer to the bus that takes you to Camp Randall Stadium." | 9. No R. |
| 10. "You'll be at the Capitol Park and you want to go to Camp Randall Stadium. What will be the destination sign on the bus?" | 10. Nakoma Rd. |
| 11. "In order to catch the Nakoma Rd. bus to go to Camp Randall Stadium, first you have to walk to the right (__________)." | 11. Bus stop |
| 12. "How will you know when you're at the right bus stop?" | 12. Sign - No Parking Bus Stop; Sign - Nakoma Rd. |
| 13. "Will you have to pay 15¢ to ride the Nakoma Rd. bus?" | 13. No |
| 14. "You pay with a (__________)." | 14. Transfer |
| 15. "What is the name of the corner where the bus stop is to catch bus route at top of card (St./Ave.) bus?" | 15. __________(St./Ave.)<br>__________(St./Ave.) |
| 16. "Go find the bus stop and wait for the bus route at top of card (St./Ave.) bus." | 16. S finds bus stop. |
| 17. Sight of bus (no cue from T) | 17. S gets on front door. |

| Teacher's Cues | Student's Responses |
|---|---|
| 18. Sight of driver (no cue from T) | 18. S shows driver route card and says: "Let me off near the Capitol Park." |
| 19. Sight of fare box (no cue from T) | 19. Pays 15¢ fare. |
| 20. Sight of transfers (no cue from T) | 20. Asks driver for a transfer. |
| 21. Sight of seats (no cue from T) | 21. Sits down |
| 22. Sight of Capitol Park; driver says: "Next stop, Capitol Park." | 22. S rings buzzer and goes to either door. |
| 23. Door opens (no cue from T) | 23. S gets off. |
| 24. "Now you're at the Capitol Park and you want to go to Camp Randall Stadium. What will be the destination sign on the bus?" | 24. Nakoma Rd. |
| 25. "Find a bus stop where the Nakoma Rd. bus comes and wait for the bus." | 25. S complies. |
| 26. Sight of Nakoma Rd. bus (no cue from T) | 26. S boards bus through front door, asks: "Let me off at Camp Randall Stadium"; pays fare and sits down. |
| 27. Sight of Camp Randall Stadium; driver: "Next stop, Camp Randall Stadium." | 27. S rings buzzer and goes to door. |
| 28. Door opens (no cue from T) | 28. S gets off. |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 29. | T takes S to the football game. | 29. | Various |
| 30. | "You're at Camp Randall Stadium and you want to go to the Capitol Park to transfer buses to go home. What will be the destination sign on the bus?" | 30. | Johnson St. |
| 31. | "If you want to go to the Capitol Park, first you have to walk to (__________)." | 31. | Bus stop |
| 32. | "Find a bus stop and wait for the Johnson St. bus." | 32. | S complies. |
| 33. | Sight of Johnson St. bus. | 33. | S goes in front door; shows route card and says: "Let me off near the Capitol Park"; pays fare; asks for transfer; sits down. |
| 34. | Sight of Capitol Park; driver says: "Next stop, Capitol Park." | 34. | S rings buzzer and walks to a door. |
| 35. | Door opens. | 35. | S gets off. |
| 36. | "Now you're at the Capitol Park and you have to transfer buses to go home, S's address. What will be the destination sign on the bus?" | 36. | Route name at top of card (St./Ave.) |
| 37. | "If you want to catch the route name at top of card bus, first you walk to the right (__________)." | 37. | Bus stop |
| 38. | "How will you know if you're at the right bus stop?" | 38. | Sign - No Parking Bus Stop; Sign - Bus route name |

| Teacher's Cues | Student's Responses |
|---|---|
| 39. "Find the bus stop and wait for the (________) (St./Ave.) bus." | 39. S complies. |
| 40. Sight of (________) (St./Ave.) bus (no cue from T) | 40. S gets on front door; shows route card and says: "Let me off near S's address"; hands driver transfer; sits down. |
| 41. Sight of bus stop near S's house; driver: "We're at S's address." | 41. S rings buzzer and goes to a door. |
| 42. Door opens. | 42. S gets off. |

Step 12 - S chooses a destination, starts out from his/her house alone, transfers at Capitol Park and arrives at the destination. S performs the behaviors required by the place he/she has travelled to. S then returns home, transferring at Capitol Park.

Materials: S's "home-bus-route-card"
Route card appropriate to the destination

Data Collection: The following responses should be listed across the top of the data sheet: 16, 17, 23, 25, 26, 28, 32, 33, 35, 39, 40, 42. Baseline data will not be taken. Criterion for the teaching trials would be three completely correct trials when transferring and three correct trials when the S does not need to transfer.

Sequence of Cues and Responses:

Teacher's Cues — Student's Responses

Repeat cues 1-33 in Step 10 of this phase. T should monitor S's behavior to insure that the S gets on and off the right buses. T should remain concealed while monitoring and should come out to greet S only after he/she has emitted the required behaviors. This step should be repeated choosing two more destinations for which S needs to transfer and three for which he/she does not.

Phase IV: Teaching Ss how to determine what bus to take to places that do not appear on bus route cards.

Step 1 - Teaching Ss to label cards with the names of major streets in the city of Madison (This is done to facilitate labeling addresses in later stages of this phase.).

Materials: The names of various streets in the city of Madison, grouped in sets of ten, printed on white index cards (See Appendix III for list of streets).

Data Collection: The name of each street that forms the set should be written across the top of the data sheet. Baseline would consist of three presentations of these cards. Criterion for the teaching trials would be 100% correct responses for three consecutive trials.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. Show S card and say: "Read the card." | 1. S reads card. |

Continue this procedure until S learns to label all the streets in the sets.

Step 2 - S looks up one of the streets acquired in Step 1 of this phase in the Street Index on the back of a map of Madison, Wisconsin. He/She then labels the coordinates listed next to the name of the street located.

Materials: Index cards
Map of Madison, Wisconsin

Data Collection: The name for each street that forms the set should be written across the top of the data sheet. Data should be recorded for responses 8, 15, 16 and 17. Baseline would consist of three presentations of the cues for each street in the set. Criterion for teaching trials would be the correct performance of responses 8, 15, 16 and 17 on three consecutive occasions for each street in the set.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. Hold up map of Madison and say: "This is a map of Madison." | 1. No R. |
| 2. "What is this?" | 2. Map of Madison |
| 3. Show side with streets and landmarks drawn in and say: "This is the front of the map." | 3. No R. |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 4. | "Which side of the map is this?" | 4. | Front |
| 5. | Turn map over to side with Street Index and say: "This is the (_________) of the map." | 5. | Back |
| 6. | "The back of the map has all the streets in the city written down." | 6. | No R. |
| 7. | Point to words Street Index and say: "All the streets are written in the Street Index.' Read this." | 7. | Street Index |
| 8. | Hold up a card with the name of the street learned in Step 1 of this phase (e.g., Atwood Ave.) and say: "Read this card and find it in the Street Index." | 8. | Atwood Ave.; S locates cued word.[17] |
| 9. | "What letter does the word Atwood start with?" | 9. | A. |
| 10. | "Point to the letter A in the Street Index and leave your finger there." | 10. | S points to A. |
| 11. | "Whenever you want to look up a street, first you look at the first letter in the word. Then you find the column in the Street Index that starts with the letter." | 11. | No R. |
| 12. | "Once you find the column that starts with the same letter as the name of the street, you move your finger down that column until you come to the second letter." | 12. | No R. |

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[17] If S fails to find the street in the Street Index, use cues 9-14 to teach the skill. Cues 9-14 should eventually be faded.

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 13. | "What is the second letter in Atwood?" | 13. | T. |
| 14. | "Move your finger until you come to the first word that starts with AT and stop." | 14. | S moves finger until first AT word. |

Note: Continue this procedure until S has located the word written on the card.

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 15. | When S finally locates the word written on the card say: "Read the word." | 15. | Atwood Ave. |
| 16. | "Now move your finger to the right along the dotted line until you come to a letter and a number." | 16. | S moves finger. |
| 17. | "Read them." | 17. | E-9 |
| 18. | "The letter and number are called coordinates." | 18. | No R. |
| 19. | "What are the letter and number called?" | 19. | Coordinates |
| 20. | "You can use the coordinates to find a street on the front of a map." | 20. | No R. |

Note: Continue this procedure until S can locate all the streets listed in the three sets in Appendix III and label their coordinates.

Step 3 - S gains experience at finding streets on a map of Madison, Wisconsin.

Materials: Index cards
Map of Madison, Wisconsin

Data Collection: Responses to cue 2 should be written across the top of the data sheet. Baseline would consist of three presentations of cue 2. Criterion for the teaching trials would be 100% correct responses to cue 2 for three consecutive trials. Baseline and teaching procedures should be repeated for each of the five streets in the three sets listed in Appendix III.

### Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. Give each student a map; hold up an index card with the name of a Madison street written on it and say: "What street is this?" | 1. S names street. |
| 2. "Look up name of st. in the Street Index; find the coordinates and then find the street on the front of the map." | 2. S performs the following:[18]<br>a. looks up st. in St. Index<br>b. finds coordinates<br>c. turns map over<br>d. puts right finger on letter<br>e. puts left finger on number<br>f. moves fingers until they meet<br>g. finds st. at junction and notifies T |
| 3. "Turn to the front of the map." | 3. S turns to front. |
| 4. "A coordinate is made up of a letter and a number. The letter part of a coordinate is located at the sides of the map." | 4. No R. |
| 5. "Point to the letters at the sides of the map." | 5. S points to letters. |
| 6. "Read the letters." | 6. S reads letters. |
| 7. "The number part of the coordinate is located at the top and bottom of the map." | 7. No R. |
| 8. "Point to the numbers." | 8. S points to numbers. |

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[18] If S responds incorrectly to cue 2, cues 3-20 should be implemented. Cues 3-20 should eventually be faded so that S eventually performs the chain of responses in response 2 without T's assistance.

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 9. | "Read the numbers." | 9. | Reads the numbers. |
| 10. | "Whenever you want to find a street on the front of the map, first you look up the name of the street in the Street Index." | 10. | No R. |
| 11. | "Look up Atwood Ave. in the Street Index." | 11. | S finds Atwood Ave. |
| 12. | "The next thing you do is find the coordinates for the street." | 12. | No R. |
| 13. | "What are the coordinates for Atwood Ave.?" | 13. | E-9 |
| 14. | "Then you turn your map to the front." | 14. | S turns to front. |
| 15. | "What is the letter part of the coordinates for Atwood Ave.?" | 15. | E. |
| 16. | "Put one of the fingers of your right hand on the letter E at the right side of the map." | 16. | S puts finger on E as directed. |
| 17. | "What is the number part of the coordinates for Atwood Ave.?" | 17. | 9 |
| 18. | "Put one of the fingers of your left hand on the number 9 at the top of the map." | 18. | S puts finger on 9 as directed. |
| 19. | "Now move the finger on the letter E to the left, and the finger on 9 down until your fingers meet, then stop." | 19. | S moves fingers until they meet, then stops. |
| 20. | "Find the street that says Atwood Ave. (show card)." | 20. | S finds Atwood Ave. |

Step 4 - Teaching Ss how to use the Madison Telephone Directory to find the address and phone number of a place they would like to go to. S also writes down the address and phone number that he/she finds.

Materials: Pencil
Paper
Madison Telephone Directory

Data Collection: List the responses across the top of the data sheet for the following: 10-23. Baseline would consist of finding three words all starting with the same letter. Criterion for teaching trials would be the correct performance of responses 10-23 for three consecutive trials.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "Sometimes you will want to take a city bus to a place that is not on your bus route cards. When this happens you will have to know the address of the place you want to go to. We are going to learn to use the Madison phone book to find these addresses." | 1. No R. |
| 2. T holds up Madison phone book and says: "What is this?" | 2. Madison phone book |
| 3. "Whenever you want to find the address of a place you want to go to, you will first have to print the name on a piece of paper." | 3. No R. |
| 4. "What's the first thing you do?" | 4. Print name on paper |

|  | Teacher's Cues |  | Student's Responses |
|---|---|---|---|
| 5. | "If you don't know how to print the name of the place you want to go to, then you will have to ask someone to print it for you." | 5. | No R. |
| 6. | "You could ask your mother, father, friend, or, if you are out, you could ask someone walking down the street." | 6. | No R. |
| 7. | "Hand a person some paper and a pencil and just say: "Would you please print (name of place you want to look up) for me?" | 7. | No R. |
| 8. | "If you needed an address printed, what would you do?" | 8. | Hand person pencil and paper and say, "Would you please print (name of place) for me?" |
| 9. | "Once you have the address printed on paper, open the phone book and find the page that starts with the first letter of the word you want to look up." | 9. | No R. |
| 10. | T writes down Arby's Roast Beef on a piece of paper and says: "Read the card." | 10. | Arby's Roast Beef |
| 11. | "If you wanted to look up Arby's Roast Beef, you would have to find the page that started with an (__________)." | 11. | A. |
| 12. | "Turn to the page that starts with an A." | 12. | S complies. |

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 13. | "What's the next letter in Arby's Roast Beef?" | 13. | R. |
| 14. | "Put your finger on the first word after all the abbreviations under the letter A." | 14. | S complies. |
| 15. | "Now move your finger until you come to the first word that starts with AR and then stop." | 15. | S complies. |
| 16. | "What's the next letter after AR in Arby's?" | 16. | B. |
| 17. | "Move your finger until you come to the first word that starts with ARB and stop." | 17. | S complies. |

Note: Continue with this procedure until S locates the word that T has written down.

| | Teacher's Cues | | Student's Responses |
|---|---|---|---|
| 18. | "When S finally locates the word that was written down say: "Read the word."" | 18. | Arby's Roast Beef |
| 19. | "Move your finger to the right until you come to the address that is printed next to the name Arby's Roast Beef." | 19. | S complies. |
| 20. | "Read the address." | 20. | 1609 S. Park |
| 21. | "Leave your finger on the address and use your other hand to print the address on the piece of paper under the name Arby's Roast Beef." | 21. | S prints 1609 S. Park |
| 22. | "Now move your finger to the right again until you come to the phone number." | 22. | S moves finger to phone number. |

| Teacher's Cues | Student's Responses |
|---|---|
| 23. "Leave your finger on the phone number and use your hand to print the phone number on the piece of paper under the address for Arby's Roast Beef." | 23. S prints 257-9934 under the address for Arby's. |

Note: Continue until S has found three addresses for every letter in the alphabet.

Step 5 - S acquires the skills necessary to call Directory Assistance to find out the phone number of a place he/she has been unable to locate in the telephone book. Next, S acquires the skills necessary to call the place to find out its address.

Materials: None

Data Collection: Data should be collected for the following responses: 2, 4, 6, 8, 10, 11, 13, 16, 18, 19, 21, 23. These responses should be listed at the top of the data sheet with Ss' names in the column on the left side. Baseline would consist of the presentation of cues 2, 4, 6, 8, 10, 11, 13, 16, 18, 19, 21 and 23 for three consecutive trials. Criterion for teaching trials would be the correct performance of the responses listed for these cues for three trials in a row.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "Sometimes you won't be able to find the place you are looking for in the phone book. Some places aren't printed in the phone book. And sometimes you might just make a mistake. So if you can't find a place in the phone book, you should call Directory Assistance." | 1. No R. |
| 2. "Who do you call when you can't find a place in the phone book?" | 2. Directory Assistance |
| 3. "Whenever you can't find a place listed in the phone book and you have to call Directory Assistance, first you should print the name of the place where you want to go." | 3. No R. |

| Teacher's Cues | Student's Responses |
|---|---|
| 4. "What's the first thing to do when you want to call Directory Assistance?" | 4. Print name of place where want to go. |
| 5. "If you don't know how to print it ask your parents, brothers or sisters, friends, or even someone you don't know to spell the name for you. Then you should print the name as they spell the letters." | 5. No R. |
| 6. "If you can't print the name of the place where you want to go, who could you ask to spell it?" | 6. Parents, brothers, sisters, friends or strangers. |
| 7. "Once you print the name, you have to call Directory Assistance. The phone number is 411." | 7. No R. |
| 8. "What is the phone number for Directory Assistance?" | 8. 411 |
| 9. "Let's say that you couldn't find Rendahl's Super Market in the phone book." | 9. No R. |
| 10. "The first thing you do is (__________)." | 10. Print Rendahl's Super Market on paper. |
| 11. "Next you dial (__________)." | 11. 411 |
| 12. "When the person answers they will say: 'Directory Assistance, for what city?'" | 12. No R. |

| Teacher's Cues | Student's Responses |
|---|---|
| 13. "When they asked ... 'for what city?', you should say (_________)." | 13. Madison |
| 14. "After you say 'Madison,' you have to ask for the phone number of the place you want to go." | 14. No R. |
| 15. "If you want the number for Rendahl's Super Market, you should say: 'May I have the phone number for Rendahl's Super Market?'" | 15. No R. |
| 16. "How would you ask for the phone number for Rendahl's Super Market?" | 16. "May I have the phone number for Rendahl's Super Market." |
| 17. "When the person tells you the phone number, you should print it on the same piece of paper that your destination is written on." | 17. No R. |
| 18. "Now that you have the phone number of the place you want to go to, how do you find the address?" | 18. Call the place and ask. |
| 19. "What would you say when someone answers your phone call?" | 19. "What is your address, please?" |
| 20. "When they tell you the address, write it down on the piece of paper that has the phone number and the name of the place where you want to go." | 20. No R. |

| Teacher's Cues | Student's Responses |
|---|---|
| 21. "There are two parts to an address. One is the (__________), and the other is (__________)." | 21. Number, Name of street |
| 22. "When the person tells you the address, write down the number part, and if you can't spell the name of the street ask them: 'Please spell Park St. for me.'" | 22. No R. |
| 23. "If you can't spell the street, what do you say?" | 23. "Please spell Park St. for me." |
| 24. "Then as the person spells it you print it next to the number part of the address." | 24. No R. |

Step 6 - S places a call to Directory Assistance and asks for the phone number of a place he/she could not find in the phone book. S writes this number down, then calls the place and asks for their address. S writes this address down.

Materials: Pencil
Paper
Actual working telephone

Data Collection: The responses listed after cue 1 should be written across the top of the data sheet. Baseline would consist of three presentations of cue 1. The criterion for the teaching trials would be three correct trials in a row in response to cue 1. Baseline and teaching should be repeated for each of ten places chosen.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "Find the phone number and address for: Rendahl's Super Market." | 1. The S does as follows:<br>a. asks T to spell the name<br>b. writes Rendahl's as T spells |

| Teacher's Cues | Student's Responses |
|---|---|
|  | c. calls Directory Assistance |
|  | d. responds with Madison to question "for what city?" from operator |
|  | e. "May I have the phone number for Rendahl's Super Market." |
|  | f. writes down number |
|  | g. hangs up |
|  | h. S calls Rendahl's |
|  | i. S says: "What is your address, please?" |
|  | j. S prints number component |
|  | k. S asks: "Please spell Park St." |
|  | l. S writes Park St. as it is spelled. |

Note: Continue this procedure until S reaches criterion for ten different places.

Step 7 - The S learns how to find an exact location on a map of Madison using the numerical component of the address.

Materials: Index cards
Map of Madison, Wisconsin, with street numbers

Data Collection: Responses 1, 2, 6-14 should be written at the top of the data sheet with Ss' names in the left hand column. Baseline would consist of three presentations of cues 1, 2, 6-14. Criterion for teaching trials would be the correct performance of the responses listed for these cues on three consecutive occasions.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. Hold up an index card with 3452 Atwood Ave. written on it and say: "Read the address." | 1. 3452 Atwood Ave. |
| 2. "Look up Atwood Ave. in the Street Index. Find the coordinates and then find the street on the map." | 2. S performs the following:<br>a. looks up st. in St. Index<br>b. finds coordinates<br>c. turns map over<br>d. puts right finger on letter<br>e. puts left finger on number |

| Teacher's Cues | Student's Responses |
|---|---|
| | f. moves fingers until they meet<br>g. finds st. at junction and notifies T |
| 3. "Do you see the small numbers written on Atwood Ave.?" | 3. Yes |
| 4. "Those numbers are like the number part of an address." | 4. No R. |
| 5. "Read some of the numbers." | 5. 2100, 2200, etc. |
| 6. Hold up the card, 3452 Atwood Ave. and say: "What are the first two numbers in 3452?" | 6. 34 |
| 7. "How many numbers are in 3452?" | 7. 4 |
| 8. "Add zeroes after 34 until you have four numbers." | 8. S writes 3400 on a card. |
| 9. "If you add two zeroes after 34 it becomes (__________)." | 9. 3400 |
| 10. "What comes after 34?" | 10. 35 |
| 11. "How many numbers in 3452?" | 11. 4 |
| 12. "Add zeroes after 35 until you have four numbers." | 12. S writes 3500 on a card. |
| 13. "If you add two zeroes after 35 it becomes (__________)." | 13. 3500 |
| 14. Hold up card and say: "This address falls between 3400 and 3500. | 14. S complies. |

| Teacher's Cues | Student's Responses |
|---|---|
| Move your finger along Atwood Ave. until it is between 3400 and 3500." | |
| 15. "This is where 3452 is." | 15. No R. |

Step 8 - S gains experience at finding exact locations on a map of Madison, Wisconsin.

Materials: Index cards
Map of Madison, Wisconsin, with street numbers

Data Collection: Write five addresses across the top of the data sheet. Baseline would consist of presenting three trials of the five addresses. Criterion for the teaching trials would be finding all five addresses for three consecutive trials.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. Hold up index card with address (number and st.) written on it and say: "Read the address." | 1. S reads address. |
| 2. "Find the street in the Street Index; look up the coordinates and locate the street on the front. Then move your finger along the street until you come to the number part of the address. Stop there." | 2. S looks up st., locates st. on front, moves finger along street and stops at approximate address. |

Note: Continue this until S has found five different addresses for three consecutive trials.

Step 9 - S is taught the names of the various bus routes listed on the front of the map.

Materials: Map of Madison, Wisconsin, with street addresses

Data Collection: Responses 2, 4, 6 and 7 should be written across the top of the data sheet with Ss' names in the left hand column. Baseline would consist of three presentations of cues 2, 4, 6 and 7. Criterion for teaching trials would be the correct performance of the responses listed for these cues on three consecutive occasions.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "All the streets that the buses travel on are written in red on the map. These red streets also have a letter in a red circle printed on them." | 1. No R. |
| 2. "What are the red lines?" | 2. Streets the buses travel on. |
| 3. "The letter in the circle tells you what bus route travels down the street in red." | 3. No R. |
| 4. "What does the letter tell you?" | 4. Bus route |
| 5. "In order to find out which bus route the letter stands for, you have to look up the letter in the box at the top right hand side of the map." | 5. No R. |
| 6. "Read all the letters and the bus routes they stand for in the box." | 6. S reads routes:<br>A G<br>B E<br>C H<br>R X<br>U |
| 7. "Find a street in red and tell me the name of the bus route." | 7. S complies. |

Step 10 - S gains more experience finding bus routes on the map of Madison.

Materials: Map of Madison, Wisconsin

Data Collection: List all the names of the bus routes across the top of the data sheet. Baseline would consist of three trials of finding each route in response to cue 1. The criterion for the teaching trials would be finding each route for three consecutive trials.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "Find a street in red and tell me the name of the bus route." | 1. S complies. |

Note: Continue this until S has found all the city bus routes for three consecutive trials.

Step 11 - S learns how to find the closest bus route to a particular street address S has located on the front of the map.

Materials: Map of the city of Madison with numbers

Data Collection: Data should be collected for responses 1, 2, 3, 4 and 6 for both baseline and teaching trials. Baseline would consist of three presentations of cues 1, 2, 3, 4 and 6. Criterion for teaching trials would be the correct performance of the responses for these cues on three consecutive occasions.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. Hold up a card with an address on it (e.g., 2100 W. Washington Ave.), and say: "Read the address." | 1. S labels 2100 W. Washington Ave. |
| 2. "Find the exact place where 2100 W. Washington Ave. is on the map." | 2. S complies. |
| 3. "Now if you want to find out what bus you could take from the Capitol Square to the place Written on the card, just look at the closest red line to the address you have found on the map." | 3. S finds line. |
| 4. "What letter is printed on the line?" | 4. G. |
| 5. "When the place you have found is to the left of the Capitol | 5. No R. |

| Teacher's Cues | Student's Responses |
|---|---|
| Park, you read the second bus route name. When it is to the right, you read the top bus route name." | |
| 6. "What would be the closest bus route to take from the Capitol Square to 2100 W. Washington Ave.?" | 6. Highland Park |

Step 12 - S gains experience at finding the appropriate bus route for various addresses, using a map of Madison, Wisconsin.

Materials: Index cards
Map of Madison with numbers

Data Collection: List the five addresses with bus routes at the top of the data sheet. Baseline information would consist of presenting the five addresses three times to S. Criterion for the teaching trials would be finding the five addresses and bus routes for three consecutive trials.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. Holding up a card with an address, T says: "Read the card." | 1. S labels card. |
| 2. "Find address on the map and tell me what is the closest bus to take to get there from the Capitol Park." | 2. S locates address and finds closest bus route. |

Note: Continue this until S has found five new addresses with bus routes for three consecutive trials.

Step 13 - S looks up an address in the phone book, locates the closest bus route, rides the bus to the destination with T and a small group of Ss.

Materials: Phone book
Map of Madison

Data Collection: Data for both baseline and teaching trials should be collected on responses 1, 2 and 3.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| 1. "Look up Arby's Roast Beef in the phone book and find the bus route you would take to get there on the map." | 1. S complies. |
| 2. (At Capitol Park) "Wait for the __________ bus and take it to Arby's." | 2. S complies. |
| 3. While on bus T says: "Look at the addresses. When you see the addresses are getting close to Arby's address, ring the buzzer and get off." | 3. S complies. |

Step 14 - Same as Step 13, except Ss travel in a small group without T.

Materials: Phone book
Map of Madison

Data Collection: Data for both baseline and teaching trials should be collected on responses 1-3.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| Repeat cues 1 and 2 from Step 13. | |

Step 15 - Same as Step 13, except S travels alone.

Materials: Phone book
Map of Madison

Data Collection: List responses 2 and 3 from Step 13 across the top of the data sheet. No baseline necessary. Criterion for the teaching trials would be three correct trials in a row.

Sequence of Cues and Responses:

| Teacher's Cues | Student's Responses |
|---|---|
| Repeat cues 1 and 2 from Step 13. | |

## Results

A summary of the criterion performance of each S in Phases I-III is presented in Table 1. It should be noted that attempts to teach Steps 10-12 of Phase III were not made because of the impending end of the school year. These steps involved taking a bus from an individual S's home and transferring to another bus in order to reach a destination. These tasks required that considerable time be spent in one to one teaching situations outside of school. Unfortunately, such time and staff could not be allocated at the end of the school year. Thus, it was concluded that it would be more useful to attempt to teach steps that could be completed under the time restrictions than to begin steps which could not. In addition, Steps 4-15 of Phase IV were not attempted because the school term ended. The deleted and untaught steps in Phases III and IV will be implemented during the subsequent school year.

As can be determined from Table 1, Ss 1-4 reached criterion on all steps of Phases I and II, but only on Steps 1-3 of Phase III. Thus, Phase IV for Ss 1-4 was not initiated. Although in Phase III, Step 4, Ss 1-4 were not able to ride the actual buses alone, they did reach criterion when bus riding was performed in conjunction with T (Step 2) or with a small group of Ss (Step 3).

Like Ss 1-4, Ss 5 and 6 did not acquire the skills necessary to ride buses alone (Phase III, Steps 4 and 9), but did reach criterion on all other steps, including Steps 1-3 of Phase IV.

Ss 7-10 performed at criterion on all steps of Phases I and II; on Steps 1-9 of Phase III; and on Steps 1-3 of Phase IV.

Figures 1-3 provide information regarding the savings in the number of teaching trials needed to attain criterion performance across related tasks within steps. Figure 1 depicts the performance of $S_6$ on the sitting and standing tasks of Step 3, Phase I. Although $S_6$ required 6 teaching trials to reach criterion on the sitting task of Step 3, teaching the standing task was unnecessary since $S_6$ performed without error during baseline trials.

Figure 2 represents the performance of $S_7$ during two sight word reading tasks of Step 1, Phase II, and the two complimentary tasks of labeling these same sets of sight words as they occurred vertically on bus route cards in Step 2, Phase II. $S_7$ required 6 teaching trials to attain criterion on the first sight word task of Step 1 (Johnson St.) and 9 teaching trials on the second sight word task of Step 1 (Highland Park). Once criterion was reached on the two tasks of Step 1, $S_7$ was immediately given the opportunity to perform the two tasks of Step 2 and performed without error during baseline trials.

Similar results are depicted in Figure 3 for $S_{10}$. Figure 3 represents the performance of $S_{10}$ on two tasks in Phase IV, Steps 2 and 3: locating two sets of streets in the street index of a map of Madison and finding these same two sets of streets on the front of the map. $S_{10}$ required 6 teaching trials to reach criterion on the first set of streets for Step 2, but required only 3 teaching trials to achieve criterion on the second set. In Step 3 S10 reached criterion after 10 teaching trials on the first set of streets while needing 3 teaching trials for the second set. In contrast to the data depicted in Figures 1 and 2, S10 did not perform without error during the baseline trials on either of the second tasks. S10 emitted 4 errors during the 3 baseline trials on the second task of Step 2 and one error for the 3 baseline trials on the second task of Step 3.

The inclusion of these figures is by no means exhaustive of all data collected. The information was chosen selectively as representative of perhaps the two most salient performance characteristics: a) that the students progressed differentially through the task analysis, and b) that many students manifested transfer of training in the form of savings in teaching trials to criterion across similar tasks and unexpectedly good performance on selected untaught tasks.

Table 1. Each "X" indicates that S reached criterion for a particular step in the program. Shaded areas represent parts of the program that were not taught.

| ▨ | PHASE I | | | PHASE II | | | | PHASE III | | | | | | | | | | | | PHASE IV | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STEPS | | | STEPS | | | | STEPS | | | | | | | | | | | | STEPS | | | | | | | | | | | | | |
| Students | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 1 | X | X | X | X | X | X | X | X | X | X | | | | | | | ▨ | ▨ | ▨ | | | | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| 2 | X | X | X | X | X | X | X | X | X | X | | | | | | | ▨ | ▨ | ▨ | | | | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| 3 | X | X | X | X | X | X | X | X | X | X | | | | | | | ▨ | ▨ | ▨ | | | | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| 4 | X | X | X | X | X | X | X | X | X | X | | | | | | | ▨ | ▨ | ▨ | | | | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| 5 | X | X | X | X | X | X | X | X | X | X | | X | X | X | X | | ▨ | ▨ | ▨ | X | X | X | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| 6 | X | X | X | X | X | X | X | X | X | X | | X | X | X | X | | ▨ | ▨ | ▨ | X | X | X | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| 7 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | ▨ | ▨ | ▨ | X | X | X | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| 8 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | ▨ | ▨ | ▨ | X | X | X | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| 9 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | ▨ | ▨ | ▨ | X | X | X | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| 10 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | ▨ | ▨ | ▨ | X | X | X | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |

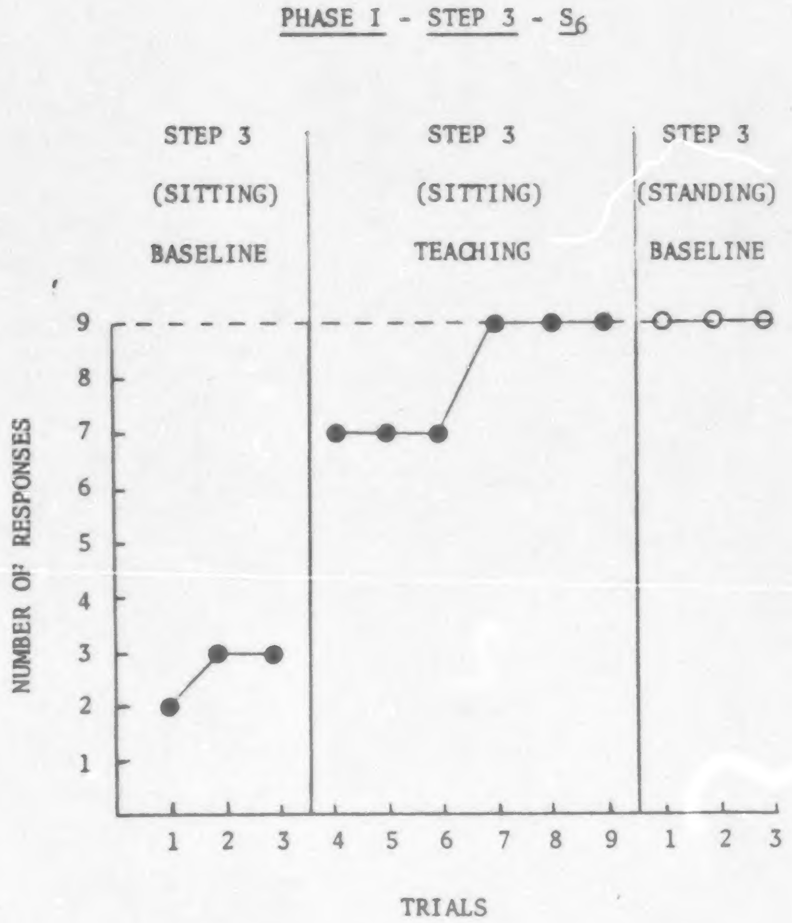
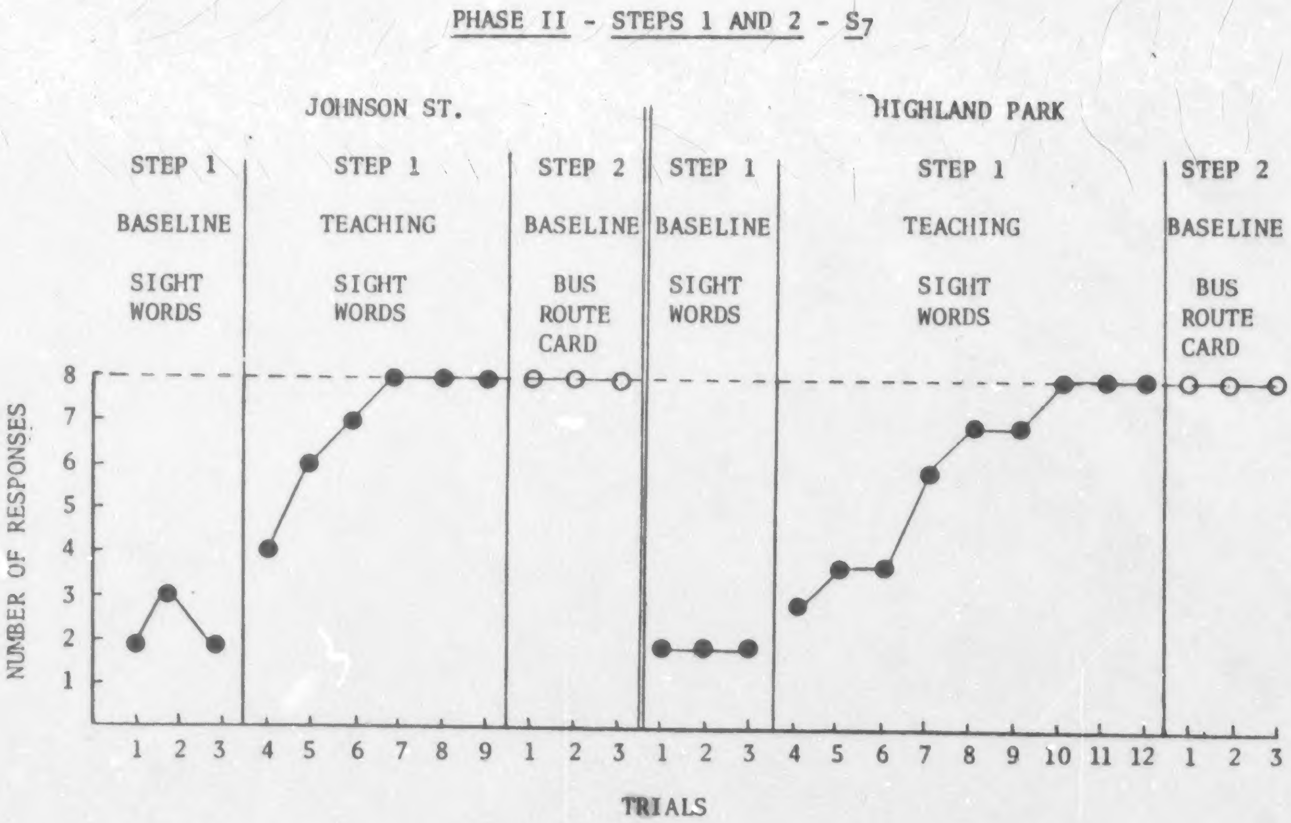


Figure 1. This figure shows the performance of $S_6$ under the baseline and teaching conditions of Phase I, Step 3. The dotted line represents criterion performance for Step 3 sitting and Step 3 standing tasks.



PHASE II - STEPS 1 AND 2 - $S_7$

Figure 2. This figure depicts the performance of $S_7$ during the sight word and bus route card trials of Phase II, Steps 1 and 2. The dotted line represents the criterion for these trials. The same criterion applies to both steps.

## PHASE IV - STEPS 2 AND 3 - $S_{10}$

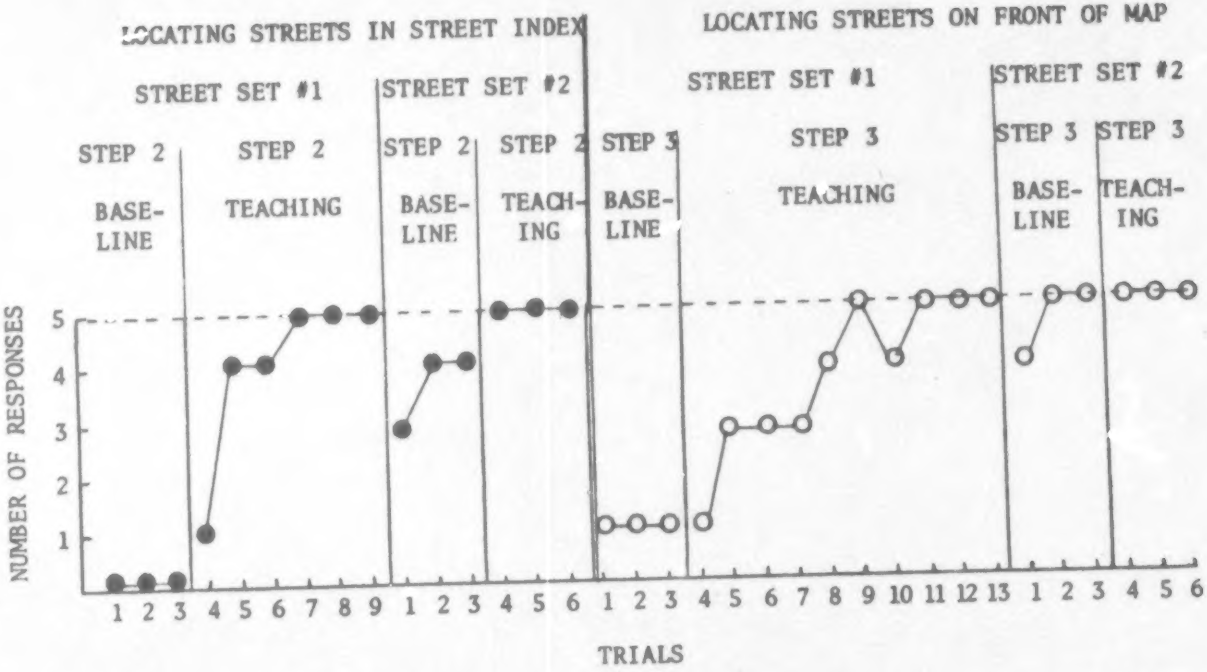


Figure 3. This graph shows the performance of $S_{10}$ during the map reading trials of Phase IV, Steps 2 and 3. The dotted line represents the criterion for these trials. The same criterion applies to both steps.

## Discussion

Bus riding skills were acquired by all ten students, although the extent to which the skills were acquired varied in degree within and between students. The program appears to have discriminated two groups of students along at least two dimensions. One dimension seemed to be the degree of independence from adults achieved. Students 1-4 were not, at the end of the school year, able to ride the buses alone but were able to ride with a small group of their peers to a chosen destination.

Students 5 and 6 did not acquire the skills necessary to ride buses without adult supervision. One student had a severe visual impairment (previously undetected) which made it impossible for her to read the destination signs on the buses as they approached bus stops. This student's vision, though, did not interfere with reading at the close distances used in the classroom phases of the program. The other student exhibited "anxious" behavior whenever required to ride alone. These behaviors were sufficiently disruptive to interfere with taking a bus alone. Attempts made to desensitize the student to riding a bus alone met with little success. However, anecdotal information indicated that when this student rode a bus with a teacher present, she was able to get off at the appropriate stops without a direct cue from the teacher. It is concluded that this student would have been able to ride independently had the "anxious" behavior been eliminated.

In contrast to Students 1-6, Students 7-10 were able to ride public buses to chosen destinations without assistance from either peers or teachers. In summary, six students (Students 1-6) achieved independence from adult supervision, although still remaining dependent upon their peers, and four students (Students 7-10) acquired the skills necessary for complete independence. Thus, it can be concluded that the objective of teaching the riding of public buses to chosen destinations, independent from adult supervision, was achieved in part.

Another dimension along which students' performance varied seemed to be related to the degree of task complexity. Students 1-4 were able to acquire the skills necessary to ride one bus to and from one destination. These same students did not acquire the skills necessary to transfer buses and to use maps. In comparison to riding one bus, the added component requiring the utilization of two buses when transferring seemed to represent a substantial increase in task complexity. Students 7-10, who performed successfully on all steps related to the riding of a single bus, also performed successfully when transferring buses was required. Students 5 and 6, with the exception of riding alone, also acquired the rudiments of transferring. In addition, Students 5-10 were able to perform the beginning components of the map reading skills. It is apparent that the instructional sequence, as written, was sufficiently detailed to enable some students to acquire the requisite skills, but not others. Whether additional trials or a finer breakdown of the instructional components would have reduced the complexity of the transfer task and enabled Students 1-4 to acquire the necessary skills cannot be concluded at this time. Further implementation of this program during the current school year will attempt to examine these and other questions.

In addition to the manner in which the program apparently discriminates within and between students, the data presented in Figures 1-3 seem to support the conclusion that the program teaches some skills that are generalizable, resulting in a savings in trials to criterion. Figure 1 shows the differences between the number of trials needed to reach criterion during the program when a sequence of ten bus riding responses were being taught using the simulated bus. The only variations between the two sets of trials was the final response in the sequence of either standing or sitting, and the imposed condition that on standing trials all the seats were occupied when the student boarded the simulated bus. The sequence of responses is considered to have generalized since once the student acquired all the skills necessary in the sitting component, the standing skills were executed without direct teaching. The successful transfer from sitting to standing seems to be a function of teaching students a general class of bus riding skills that are adaptable to various riding conditions. The high performance level of the standing trials cannot be attributed to scheduled reinforcement, since they were conducted under baseline conditions. The skills acquired during the sitting trials then seem to have generalized to standing and were maintained in the absence of direct reinforcement.

Figures 2 and 3 contain data which also support a conclusion regarding the existence of generalization across altered stimulus conditions. The data in Figure 2 shows that once Student 7 had mastered each set of individually presented sight words, he was able to label these same words when they were presented under an entirely different format--the format of the bus route cards. As in the standing trials of Figure 1, the presentation of the route cards was done under baseline conditions. The labeling responses acquired in the first step appeared to have generalized to the new stimulus situation in the absence of scheduled reinforcement. Likewise, the data presented in Figure 3 for Student 10 suggests that after the components of looking up a street name and finding its coordinates had been performed to criterion for one set of streets, the necessary skills were emitted for the second set of streets with relatively few errors. This pattern also was apparent for the step which utilized these coordinates to find street locations on the front of the maps. The fact that a few errors occurred during the baseline component when each of the second set of streets were presented was probably a function of the difficulty of the map reading phase when compared to the other two phases for which data are presented. Three perfect trials were required before the students were considered to have reached criterion for all the steps in the program. Admittedly, this is not a very stringent criterion. The errors emitted by Student 10 indicate the possible need for a more demanding criterion performance when teaching the complex skills of Phase IV. In addition, the fact that all of the students were very familiar with the mechanics of sight-reading may also have led to this difference in errors emitted. It is significant, though, that there is a greater number of errors in the first baseline (i.e., with the first set of streets) in the map reading data than those found during the baseline for the second set of streets for each skill taught. The data seem to suggest the existence of general classes of skills that are generalizable across varying stimulus conditions. Since students will be expected to respond to varying conditions when they are using public transit, the generalizable skills taught may have crucial practical value. Furthermore, the real success of such a program may lie solely in its ability to teach students skills that are functional under changing conditions.

## Suggestions for Implementation

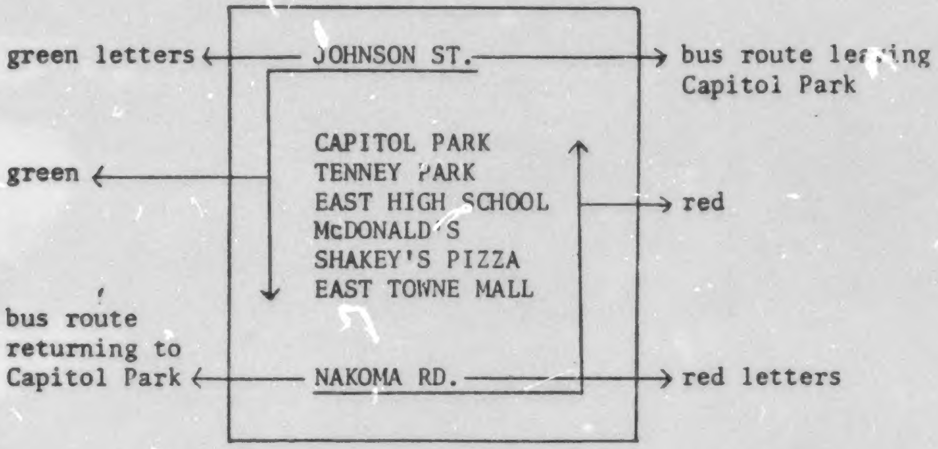
In addition to the points brought up in the introduction, the following suggestions may be useful:

1. In Step 5 of Phase IV, a template was used to help some of the students zero in on the quadrant where the street they were required to find was located. The template was a square piece of cardboard which simply formed a border around the area in which the students were looking. The template was faded as quickly as possible so that the students would not become too dependent on it.
2. The use of videotapes in Step 4 of Phase II is not a necessary component of the program. This step may be eliminated without disrupting the task sequence. It was initiated in order to save some trials when actually riding the buses. After the students had gained some experience rding actual city buses, the use of videotape resulted in the elimination of the first step of riding, the step that sends them with the teacher, and enabled them to begin right away riding in a small group.
3. When presenting the videotape in Step 4 of Phase II, the tape was stopped after the destination in question had flashed across the monitor. This not only simulates what would happen during an actual bus ride, but also decrease the time it takes to conduct a trial.
4. Because of the difficulty some students encountered with the transfer phase, it is necessary to make some suggestions about how this problem might be avoided. First of all, transfering buses could be simulated through a role playing situation in the classroom. This might facilitate acquisition. Videotape presentation of two routes where transfering is necessary to reach the cued destination may also be helpful.
5. When the students were out riding a bus, they always went to a destination for a specific purpose. They went to movies, parks, and bought items in stores. This was done to emphasize the functional reason for taking a bus whether it be business or pleasure.

## Appendix I

Example of bus route cards:

a. Johnson St./Nakoma Rd.[19]


green letters
JOHNSON ST.
bus route leaving Capitol Park
green
CAPITOL PARK
TENNEY PARK
EAST HIGH SCHOOL
McDONALD'S
SHAKEY'S PIZZA
EAST TOWNE MALL
red
bus route returning to Capitol Park
NAKOMA RD.
red letters

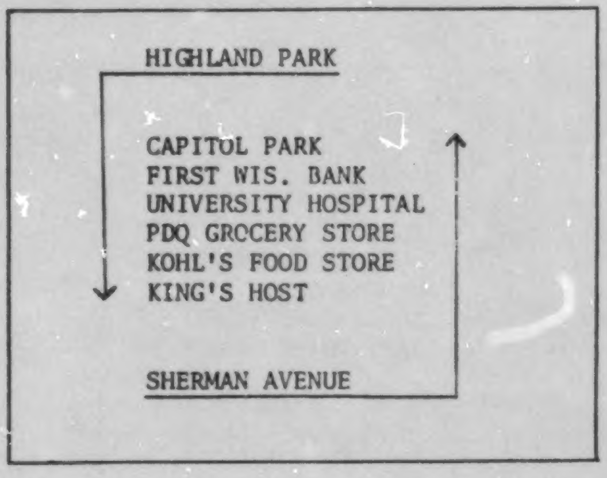
3 x 6 index card with destinations written in black

---

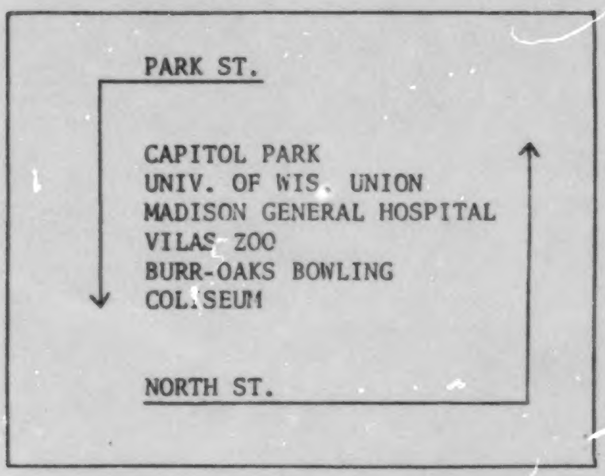
[19] The card above and the ones that follow represent those originally used in the program. The prosthetic cues built into the card were eventually faded yielding a final set of cards having no arrows or color cues.

## Appendix I

b. Highland Park/Sherman Ave. (color and layout same as Johnson St./Nakoma Rd. card)

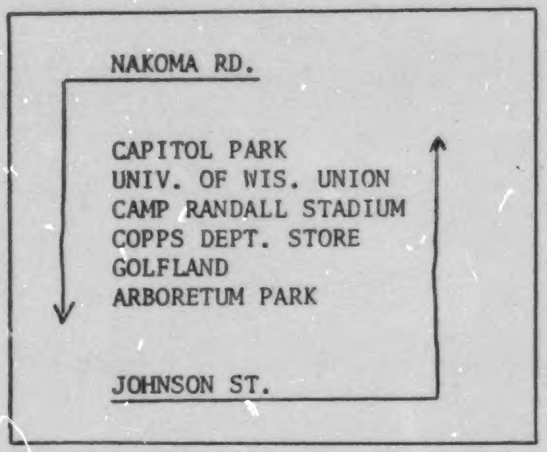

HIGHLAND PARK
CAPITOL PARK
FIRST WIS. BANK
UNIVERSITY HOSPITAL
PDQ GROCERY STORE
KOHL'S FOOD STORE
KING'S HOST
SHERMAN AVENUE

c. Park St./North St. (color and layout same as Johnson St./Nakoma Rd. card)


PARK ST.
CAPITOL PARK
UNIV. OF WIS. UNION
MADISON GENERAL HOSPITAL
VILAS ZOO
BURR-OAKS BOWLING
COLISEUM
NORTH ST.

## Appendix I

d. Nakoma Rd./Johnson St. (color and layout same as Johnson St./ Nakoma Rd. card)

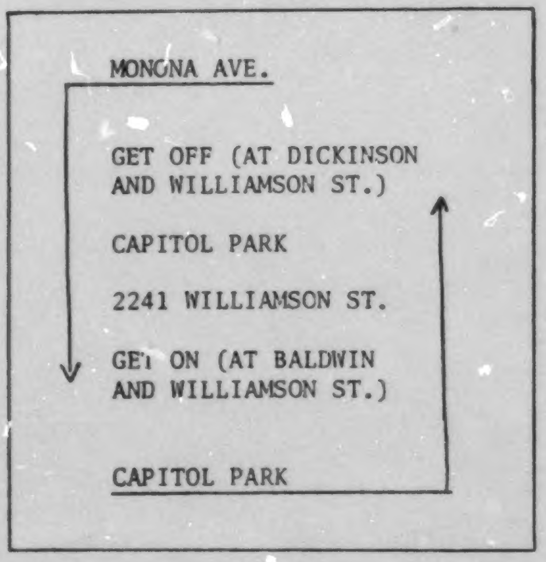


NAKOMA RD.

CAPITOL PARK
UNIV. OF WIS. UNION
CAMP RANDALL STADIUM
COPPS DEPT. STORE
GOLFLAND
ARBORETUM PARK

JOHNSON ST.

e. Example of a "home-bus-route-card" (color and layout same as Johnson St./Nakoma Rd. card)



MONONA AVE.

GET OFF (AT DICKINSON
AND WILLIAMSON ST.)

CAPITOL PARK

2241 WILLIAMSON ST.

GET ON (AT BALDWIN
AND WILLIAMSON ST.)

CAPITOL PARK

# Appendix II

Below is a listing of places that the students were taught to take a bus to. Some of those listed were within walking distance of the Capitol Park. This information was shown to the students on individual "bus route cards" which consisted of a white 3 x 6 index card with the name of the bus route written at the top and bottom and each place they could go to along that route. In the following listing the names of the appropriate bus routes appear after the destination.

## Services:

### Health -

Near Eastside Health Center (Monona Ave./Capitol Park)
Dane County Mental Health Center (Capitol Park)
Dane County Dental Clinic (Capitol Park)
Wisconsin Central Colony (Sherman Ave./Highland Park)

### Social -

Dane County Social Services (Sherman Ave./Highland Park)

### Legal -

Legal Services Center (Capitol Park)

### Rehabilitation -

Madison Opportunity Center (Monona Ave./Capitol Park)

### Banks -

First Wisconsin National Bank (Highland Park/Sherman Ave.)
American Exchange Bank (Capitol Park)

### Miscellaneous -

Madison Area Association for Retarded Citizens (Sherman Ave./Highalnd Park)
Post Office (main) (Capitol Park)
Police Station (main) (Capitol Park)
Public Library (main) (Capitol Park)

## Food:

### Retail Grocery -

## Appendix II

PDQ Grocery Store (Highland Park/Sherman Ave.)
Kohl's Food Store (Highland Park/Sherman Ave.)

Prepared -

McDonald's (Johnson St./Nakoma Rd.)
Shakey's Pizza (Johnson St./Nakoma Rd.)
King's Host (Highland Park/Sherman Ave.)

General Merchandise & Clothing:

Copps Department Store (Nakoma Rd./Johnson St.)
East Towne Mall (Johnson St./Nakoma Rd.)
Treasure Island (Ridgewood)
Penney's Department Store (Capitol Park)
Kresge's 5-10¢ (Capitol Park)
Rennebohm's Drug Store (Capitol Park)

Recreation:

Parks -

Tenney Park (Johnson St./Nakoma Rd.)
Vilas Zoo (Park St./North St.)
Arboretum Park (Nakoma Rd./Johnson St.)

Theaters -

Capitol Theater (Capitol Park)
Esquire Theater (Capitol Park)
Strand Theater (Capitol Park)
East Towne Cinema I & II (Johnson St./Nakoma Rd.)
University of Wisconsin Union (Park St./North St.)

Sports -

See parks
Camp Randall Stadium (Nakoma Rd./Johnson St.)
YMCA (Capitol Park)
East High School (Johnson St./Nakoma Rd.)
Golfland (Nakoma Rd./Johnson St.)
Burr-Oaks Bowling (Park St./North St.)

## Appendix III

The following is a list of streets in the city of Madison taught to the students.

Set 1

Johnson St.
Nakoma Rd.
Midvale Blvd.
Mineral Point Rd.
University Ave.

Set 2

Sherman Ave.
Milwaukee St.
Atwood Ave.
S. Park St.
E. Washington Ave.

Set 3

Packers Ave.
Fair Oaks Ave.
Westmorland Blvd.
Wilson Dr.
Williamson St.

## Appendix IV

Example of a data sheet:

Description of responses goes here.

| Name | McDonald's | Tenney P. | Shakey's Pizza | | | | | |
|---|---|---|---|---|---|---|---|---|
| J.S. | + | + | + | | | | | |
| N.J. | + | - | + | | | | | |
| B.T. | - | - | + | | | | | |
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## Appendix V

General working vocabulary taught in context of steps (i.e., not on index cards):

destination
fare
fare-box
bus stop
coordinate
Madison phone book
Street Index
transfer
bus route card
Madison Metro bus
city bus
school bus

# TEACHING ORTHOPEDICALLY HANDICAPPED ADOLESCENTS TO SECURE SELECTED PRODUCTS AND SERVICES FROM THEIR COMMUNITY THROUGH FUNCTIONAL USE OF THE YELLOW PAGES AND TELEPHONE

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Abstract: Five orthopedically handicapped students were taught to use the yellow pages of the local telephone directory and a telephone to secure the delivery of a limited number of goods and services necessary for independent community living. The program was divided into six phases. Phase I focused on the skills necessary to locate the phone numbers of businesses with delivery service. Phase II involved linking a needed product or service with its generic class (e.g., food for supper / grocers - retail). Phase III extended the skills of Phase I to situations where businesses were verbally cued. In Phase IV the students were required to write down the names and phone numbers of the businesses located. Phase V taught the verbal responses necessary to order a product or service and dial a telephone number. Finally, Phase VI brought each of the discrete components together, requiring the students to actually secure a product or service through the use of the yellow pages and telephone. Through the development of such skills, students who had difficulty traveling to businesses acquired an alternative strategy which resulted in an increased level of self-sufficiency.

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# INTRODUCTION

In recent years there has developed a greater interest in providing special services and facilities for the physically handicapped in our communities. Whether it has been due to the political actions of the young men who returned from the Vietnam War physically disabled, or whether it is due to a growing concern on the part of our society for this overlooked segment of our population, is difficult to ascertain.

Nonetheless, one can see the results of this interest beginning to appear--especially in metropolitan areas. Sidewalks are being constructed with curbs sloping to the crosswalk; public restrooms are equipped with wider stalls and special hand rails; public telephone booths in shopping centers are being built at waist level; and city councils are requesting funds for city buses specially equipped with ramps for wheelchairs.

Each of these improvements allows for greater freedom and independence for the physically handicapped. However, hundreds of barriers still remain to be overcome. For example, grocery stores have shelves that are often too high for a person confined to a wheelchair to reach; many restaurants have aisles, booths, and tables that are too small to be negotiated by with a wheelchair; and many businesses are inaccessible due to the sheer weight of their door. These and other barriers make it difficult for most physically handicapped persons to survive independently in a community.

The rationale for teaching orthopedically handicapped adolescents how to use the yellow pages and the telephone is directly related to the nature of their handicapping condition and to the physical obstacles which they face. Until such time that our society completely removes the physical barriers to independent living, these adolescents must be equipped with a set of skills to overcome these obstacles.

One such set of skills is the efficient use of the telephone and yellow pages. Almost every product and service necessary for living can be secured through the telephone--whether it be having groceries delivered or being fitted with orthopedic shoes within the home. The yellow pages is the tool necessary to find out what services exist, the businesses which offer them, and the telephone numbers of these businesses. This program attempted to teach five orthopedically handicapped students the skills necessary to locate products and services listed in the yellow pages and to use the telephone to secure them.

## METHOD

### Students (Ss)

The 5 Ss involved were enrolled in a public school program for orthopedically handicapped students. Ss ranged in chronological age from 8 years 11 months to 16 years 2 months ($\overline{X} = 12.7$). I.Q. scores for these Ss range from 67 to 96 ($\overline{X} = 82.6$). The length of time these Ss had spent in public school programs varied from 1 to 8 years ($\overline{X} = 4.2$).

$S_1$ was a 12 year and 9 month old boy with a medical diagnosis of cerebral palsy. He was ambulatory with the use of crutches and wore glasses because of visual difficulties. He obtained an I.Q. score of 76 (full scale) on the Wechsler Intelligence Scale for Children and was reported to be functioning at a 3.0 grade level of instruction. According to school records in his cumulative folder he was described as "not doing as well as he could," "not ready for integration," and in need of "continued help to develop good study skills."

$S_2$ was an 8 year and 11 month old boy with a medical diagnosis of muscular dystrophy. He was ambulatory with aid, but spent the school day in a wheelchair. He obtained an I.Q. score of 96 (full scale) on the Wechsler Intelligence Scale for Children and was reported to be functioning at a 3.0 grade level of instruction. During his initial year in orthopedic school he was described in school records as "making an excellent adjustment," "gaining confidence," and "becoming more outgoing."

$S_3$ was a 16 year and 2 month old boy with a medical diagnosis of muscular dystrophy. He was confined to a wheelchair. On the Wechsler Adult Intelligence Scale he obtained an I.Q. score (full scale) of 78 and was reported to be functioning at a 2.0 grade level of instruction. His school records described him as a "good worker," "conscientious," and with "a good attitude."

$S_4$ was a 14 year and 7 month old boy with a medical diagnosis of spina bifida. He wore leg braces and was confined to a wheelchair. He wore glasses because of visual difficulties. He obtained an I.Q. score of 67 (full scale) on the Wechsler Intelligence Scale for Children and was reported to be functioning at a 1.0 grade level of instruction. Prior to foster home and public school placement, he resided in a state institution.

$S_5$ was an 11 year and 2 month old boy with a medical diagnosis of muscular dystrophy. He was confined to a wheelchair. On the Wechsler Intelligence Scale for Children he obtained an I.Q. score of 96 (full scale) and was reported to be functioning at a grade level of 3.0. According to his school records he was described as having "few group skills," and needing to become "more sensitive to the feelings of others."

The 5 Ss were in one instructional group and all instruction was conducted as a regular class activity. The group participated in the program for at least 40 minutes per day, 4 days per week.

## Instructional Prerequisites

The students who received instruction in this program were not academically naive when the program was initiated. Before formal training in this program began, they were either taught or requested to verify mastery of the following prerequisite skills:

### Letters and Words

1. Verbal imitation of the names of the letters of the alphabet.
2. Touching the appropriate letter of the alphabet when requested by the teacher.
3. Labeling the letters of the alphabet when randomly presented on flashcards.
4. Verbally listing the letters of the alphabet in sequence.
5. Labeling the letter subsequent to each letter of the alphabet.
6. Labeling the letters of 5 printed guide words[2] and 5 heading words[3] as presented on flashcards.
7. Labeling the letters of 5 heading words and 5 guide words (i.e., words that appear on the top of each page of the yellow pages that indicate a gross classification of the type of goods and services that are listed below) as they actually appear in the yellow pages.
8. Copying the 26 letters of the alphabet in both upper and lower case.

---

[2] Guide word refers to the two words that appear at the top of each page of the yellow pages. These words indicate the range of businesses listed alphabetically on each page. For example, "Taxicabs - Taxidermists," would indicate that taxicab companies are found at the beginning of the listing and taxidermists are listed at the end of the page.

[3] Heading words refer to the subtitles found in the yellow pages. These words indicate a more precise classification than guide words. "Grocers - retail" is an example which indicates a type of grocer.

Numerals

9. Verbal imitation of the numeral names 0 - 9.

10. Pointing to each numeral 0 - 9, listed in serial order on a strip of paper, when requested at random.

11. Labeling the numerals 0 - 9 as they were randomly presented on flashcards.

12. Labeling the numerals of 5 telephone numbers as they actually appear in the yellow pages.

13. Copying the numerals 0 - 9.

Telephone

14. Pointing to each numeral on the telephone when directed by the teacher.

15. Labeling each numeral on the telephone.

16. Dialing a single number from 0 - 9 following the teacher's verbal directive.

17. Dialing a 7-numeral telephone number printed on a card.

Yellow Pages

18. Discriminating between the white and yellow pages of the telephone book.

19. Turning the pages of the telephone book one at a time.

20. Opening to sections of the yellow pages that were divided by alphabetical markers in response to printed cues.

21. Discriminating between a guide word and heading word by touching one of these two classes of words when directed by the teacher.

Task Analysis

This program is an attempt to organize and teach several basic yellow pages and telephone skills and to provide an instructional model which may be utilized to develop other related telephone and telephone book skills for orthopedically handicapped students. In order to communicate the relevant components of the instructional program, as well as to delineate the specific skills required, a detailed task analysis follows:

Phase I: Teaching students the location of heading and guide words in the yellow pages from a printed cue.

Part 1 - Teaching students to label the first letter of a heading word from a printed cue (e.g., "What is the first letter in this word - Cleaners?").

Part 2 - Teaching students to locate the section of the yellow pages corresponding to the first letter of the word (e.g., "Find the C section of the yellow pages.").

Part 3 - Teaching students to locate the first guide word in the yellow pages corresponding to the first letter of the word (e.g., C - CALKING).

Part 4 - Teaching students to locate the first heading word on that page corresponding to the first letter of the word (e.g., C - Cabanas-Builders).

Part 5 - Teaching students to label the first two letters of a heading word from a printed cue (e.g., "What are the first two letters in this word - Cleaners?").

Part 6 - Teaching students to locate the first guide word in the yellow pages corresponding to the first two letters of the word (e.g., CL - CLAY).

Part 7 - Teaching students to locate first heading word on that page corresponding to the first two letters of the word (e.g., CL - Claim Adjusters).

Part 8 - Teaching students to label the first three letters of a heading word from a printed cue (e.g., "What are the first three letters in this word - Cleaners?").

Part 9 - Teaching students to locate the first guide word in the yellow pages corresponding to the first three letters of the word (e.g., Cle - CLEANERS).

Part 10 - Teaching students to locate the first heading word on that page corresponding to the first three letters of the word (e.g., Cle - Cleaners).

Part 11 - Teaching students to label the first four letters of a heading word from a printed cue.

Part 12 - Teaching students to locate the first guide word in the yellow pages corresponding to the first four letters of the word.

Part 13 - Teaching students to locate the first heading word on that page corresponding to the first four letters of the word.[4]

Phase II: Teaching students to name heading words which correspond to statements concerning the function of community services.

Part 1 - Teaching students to label 10 heading words as found in the yellow pages (e.g., "What word is this?").

---

[4] Parts 5 - 13 may be unnecessary depending on the heading word and the organization of the yellow pages. For example, Parts 1 - 10 are sufficient to locate the heading word Cleaners. However, all 13 parts are required to locate a heading word like Hospital Equipment & Supplies.

Part 2 - Teaching students to mark heading words which correspond to statements concerning the function of community services (e.g., "Mark the heading word under which you will find the name of a business that will pick up and deliver clothes to be dry cleaned.").

Part 3 - Teaching students to name heading words which correspond to statements concerning the function of community services (e.g., "Name the heading word under which you will find the name of a business that will pick up and deliver clothes to be dry cleaned.").

Phase III: Teaching students the location of heading and guide words in the yellow pages from a verbal cue.

Part 1 - Teaching students to name the first letter of a heading word from a verbal cue (e.g., "What is the first letter of the heading word Cleaners?").

Part 2 - Teaching students to locate the section of the yellow pages corresponding to the first letter of the word (e.g., "Find the C section of the yellow pages.").

Part 3 - Teaching students to locate the first guide word in the yellow pages corresponding to the first letter of the word (e.g., C - CALKING).

Part 4 - Teaching students to locate the first heading word on that page corresponding to the first letter of the word (e.g., C - Cabanas-Builders).

Part 5 - Teaching students to name the first two letters of a heading word from a verbal cue (e.g., "What are the first two letters of the heading word Cleaners?").

Part 6 - Teaching students to locate the first guide word in the yellow pages corresponding to the first two letters of the word (e.g., Cl - CLAY).

Part 7 - Teaching students to locate the first heading word on that page corresponding to the first two letters of the word (e.g., Cl - Claim Adjusters).

Part 8 - Teaching students to name the first three letters of a heading word from a verbal cue (e.g., "What are the first three letters of the heading word Cleaners?").

Part 9 - Teaching students to locate the first guide word in the yellow pages corresponding to the first three letters of the word (e.g., Cle - CLEANERS).

Part 10 - Teaching students to locate the first heading word on that page corresponding to the first three letters of the word (e.g., Cle - Cleaners).

Part 11 - Teaching students to label the first four letters of a heading word from a verbal cue.

Part 12 - Teaching students to locate the first guide word in the yellow pages corresponding to the first four letters of the word.

Part 13 - Teaching students to locate the first heading word on that page corresponding to the first four letters of the word.

Phase IV: Teaching students to locate the telephone numbers of five businesses which do deliver products and services in the community and to write the names of the businesses and the telephone numbers on a piece of paper.

Part 1 - Teaching students to label 10 selected sight words commonly found in the yellow pages that indicate delivery service (e.g., FREE PICK-UP AND DELIVERY).

Part 2 - Teaching students to scan the column under a heading word from a verbal cue and to locate one of the 10 sight words indicating that the business does deliver its product or service (e.g., "Point to a word or words in the Cleaners section which tell us that the business delivers.").

Part 3 - Teaching students to locate the name of the business that offers the delivery service (e.g., Madison Steam & Dye Works).

Part 4 - Teaching students to write the name of the business on a piece of paper (e.g., "Write the name of the business on a piece of paper.").

Part 5 - Teaching students to locate the telephone number of the business that offers the delivery service (e.g., 257-1073).

Part 6 - Teaching students to write the telephone number of the business on a piece of paper next to its name (e.g., "Write the telephone number of the business on the piece of paper next to its name.").

Phase V: Teaching students the verbal responses necessary to call five businesses on the telephone and have products or services delivered.

Part 1 - Teaching students to respond with a greeting, statement of name, and statement of need (e.g., "Hello. My name is John Hayes. I would like to have some clothes to be dry cleaned picked up at my school.") from a visual and verbal cue of greeting and business identification from the receiving end of the phone (e.g., "Good afternoon. Madison Steam & Dye.").

Part 2 - Teaching students to respond with a statement of correct address (e.g., "Lapham School. 1045 East Dayton Street. Room 117.") from a visual and verbal cue of inquiry of address from the receiving end of the phone (e.g., "What is the name and address of the school?").

Part 3 - Teaching students to respond with statement of name and teacher's name (e.g., "John Hayes. The cleaning will be billed to my teacher, Mrs. Kittelsen.") from a visual and verbal cue of inquiry of name from the receiving end of the phone (e.g., "What is your name?").

Part 4 - Teaching students to respond with a description of the product desired from a visual and verbal cue of inquiry of kind of product desired from the receiving end of the phone.[5]

Part 5 - Teaching students to respond with a statement of time (e.g., "Today or tomorrow before three.") from a visual and verbal cue of inquiry of time from the receiving end of the phone (e.g., "When can we pick those up?").

Part 6 - Teaching students to respond with a statement of gratitude and closing (e.g., "Thank you. Goodbye.") from a visual and verbal statement of gratitude and closing from the receiving end of the phone (e.g., "We will take care of it. Thank you. Goodbye.").

Phase VI: Teaching students to arrange the delivery of 5 products or services to the school through use of the yellow pages and telephone.

## Instructional Materials and Teaching Arrangement

### Phase I: Teaching students the location of heading and guide words in the yellow pages from a printed cue.

Instructional Materials: In Phase I the following instructional materials were utilized:

A. Ten 3" x 5" flashcards, each containing a printed heading word, were constructed. The heading words selected were judged most functional for the needs of an orthopedically handicapped person. A second consideration was that each word could be found in the yellow pages by using the procedure outlined in Phase I of this program. It should be noted here that a minority of heading words cannot be found in the yellow pages using this procedure; however, the majority can. The 10 heading words were divided into 2 sets as follows:

---

[5] In the example of having clothes picked up to be dry cleaned, this step is not necessary. However, in the case of having flowers or a pizza delivered it is necessary.

Set I

1. Cleaners
2. Florists - Retail
3. Grocers - Retail
4. Laundries
5. Pizza

Set II

6. Bakers - Retail
7. Cheese
8. Cosmetics & Perfumes - Retail
9. Dairies
10. Hospital Equipment & Supplies

B. A City of Madison Telephone Directory (January, 1974) was used by the students to locate heading and guide words. The yellow pages of the telephone directories were divided into sections by alphabetical tab markers. This made the process of looking up words more expedient as well as less physically demanding.

C. A sample data sheet used to record student progress during teaching in Phase I is presented in Appendix A1.

D. A stopwatch was used to record the time taken to look up a heading word during testing in Phase I.

E. A sample data sheet used to record times during testing in Phase I is presented in Appendix A2. S's names were written on the vertical grid under "Name" and the heading words printed horizontally across the top of the sheet.

Teaching Arrangement: During teaching in Phase I Ss were seated around a rectangular classroom table. At one end of the table T placed the heading word flashcard on a wooden frame so that each S could see the word. During each part of instruction T gave a verbal cue and then walked around the table with the data sheet marking responses. Each S response was marked before T gave the verbal cue for the next part. It should be noted that in Parts 1, 5, 8, and 11 the Ss responded to the cues in unison, and each S was marked with a correct response; during baselining of prerequisite skills it was determined that each S had the skill of labeling the letters of the heading words in his repertoire. During testing of

Phase I, T gave the verbal cue and then walked around the table with a stopwatch and the data sheet and recorded the exact time when S located the heading word. In addition, each S had a portable barrier between himself and another S to prevent mutual responding during testing.

Phase II: Teaching students to name heading words which correspond to statements concerning the function of community services.

Part 1

Instructional Materials: In Phase II, Part 1, the following instructional materials were utilized:

A. The ten 3" x 5" flashcards containing printed heading words used in Phase I were used in Part I of Phase II.

B. A sample data sheet used to record progress in Phase I, Part 1 is presented in Appendix A2. Ss' names were written on the vertical grid under "Name" and the 10 heading words printed horizontally across the top of the sheet.

Teaching Arrangement: During Phase I, Part 1, Ss were seated around a rectangular classroom table. T sat at the head of the table and presented the flashcards one at a time to each S.

Part 2

Instructional Materials: In Phase II, Part 2, the following instructional materials were utilized:

A. A worksheet containing 10 sets of three potential answer components was constructed. This worksheet was arranged so that heading words could be easily circled or underlined by Ss. An example of the worksheet is contained in Appendix A3.

B. A sample data sheet used to record progress in Phase II, Part 2, is presented in Appendix A3.

Teaching Arrangement: During Phase II, Part 2, T and Ss were seated around a rectangular classroom table. T read a statement concerning the function of a community service and then read the three heading words listed under question #1. Ss were to mark the correct heading word. T repeated the statement and the answer components once. After each S had marked a response, T proceeded to question #2, 3, 4, and so on. The statements read were as follows:

1. Mark the heading word under which you will find the name of a business that will pick up and deliver clothes to be dry cleaned.

2. Mark the heading word under which you will find the name of a business that will deliver groceries to your house.

3. Mark the heading word under which you will find the name of a business that will deliver milk, butter, and ice cream to your house on a daily basis.

4. Mark the heading word under which you will find the name of a business that will deliver wheelchairs, walkers and crutches to your home.

5. Mark the heading word under which you will find the name of a business that will deliver a pizza to your home.

6. Mark the heading word under which you will find the name of a business that will deliver cheese to your home.

7. Mark the heading word under which you will find the name of a business that will deliver flowers to a person.

8. Mark the heading word under which you will find the name of a business that will deliver special wedding and birthday cakes.

9. Mark the heading word under which you will find the name of a business that will pick up and deliver clothes to be washed and ironed.

10. Mark the heading word under which you will find the name of a business that will deliver make-up, lotions, and perfumes to your home.

## Part 3

Instructional Materials: In Phase II, Part 3, the following instructional materials were utilized:

A. A sample data sheet used to record progress in Phase II, Part 3, is presented in Appendix A2. Ss names were written on the vertical grid under "Name" and the ten heading words representing the correct answers to the ten statements illustrated in Phase II, Part 2 - Teaching Arrangement were printed horizontally across the top of the sheet.

Teaching Arrangement: During Phase II, Part 3, T worked with each S individually at a rectangular classroom table.

Phase III: Teaching students the location of heading and guide words in the yellow pages from a verbal cue.

Instructional Materials: In Phase III the following instructional materials were utilized:

A. The City of Madison Telephone Directory (January, 1974) as described in Phase I - Instructional Materials was used in Phase III of this program.

B. A sample data sheet used to record student progress during teaching in Phase III is presented in Appendix A1.

C. A stopwatch was used to record time taken to locate a heading word during testing in Phase III.

D. A sample data sheet used to record times during testing in Phase III is presented in Appendix A2. Ss' names were written on the vertical grid under "Name" and the heading words printed horizontally across the top of the sheet.

Teaching Arrangement: During Phase III teaching and testing was carried out as in Phase I except that Ss were given no visual cues. As in Phase I, Ss responded to the verbal cues in unison in Parts 1, 5, 8, and 11. This step, however, was not baselined previously; in retrospect, the author feels that this step should not have been overlooked.

Phase IV: Teaching students to locate the telephone numbers of 5 businesses which do deliver products and services in the community and to write the name of the businesses and the telephone numbers on a piece of paper.

Part 1

Instructional Materials: In Phase IV, Part 1, the following instructional materials were utilized:

A. Ten 3" x 5" flashcards each containing a sight word indicating delivery service were constructed. The words were cut out from the yellow pages themselves and pasted on the cards so as to replicate the exact size and print type. The words were selected because of their frequency of appearance in the yellow pages and each appeared at least once in the columns under the heading words presented in this program. A listing of the 10 words follows:

1. We Deliver
2. Free Pick-Up and Delivery
3. FAST PICK-UPS-DELIVERY
4. DELIVERED ANYWHERE
5. PICK-UP and DELIVERY
6. CITY DELIVERY
7. WE DELIVER
8. Free Pick-Up and Delivery (large bold print)
9. Pick-Up and Delivery
10. Radio Equipped Trucks
    FOR PICK-UP AND DELIVERY
    DIAL

B. A sample data sheet used to record progress in Phase IV, Part 1, is presented in Appendix A2. *Ss'* names were written on the vertical grid under "Name" and the 10 sight words printed horizontally across the top of the sheet.

*Teaching Arrangement*: During Phase IV, Part 1, *T* and *Ss* were seated around a rectangular classroom table. *T* presented the flashcards one at a time to each *S*.

### *Parts 2, 3, 4, 5, and 6*

*Instructional Materials*: During Phase IV, Parts 2, 3, 4, 5, and 6 the following instructional materials were utilized:

A. The City of Madison Telephone Directory (January, 1974) as described in *Phase I - Instructional Materials* was used in Phase IV, Parts 2 - 6, of this program.

B. A piece of note paper and a pencil were given to each *S*.

C. A sample data sheet used to record progress during Phase IV, Parts 2 - 6, is presented in Appendix A4.

*Teaching Arrangement*: During Phase IV, Parts 2 - 6, *T* and *Ss* were seated around a rectangular classroom table. *T* gave a verbal cue for each part and when *Ss* had made their responses, they raised their hands. *T* would check and record the response for each *S* before giving the cue for the following part.

*Phase V*: *Teaching students the verbal responses necessary to call 5 businesses on the telephone and have products or services delivered.*

*Instructional Materials*: During Phase V the following instructional materials were utilized:

A. Five scripts each containing a 2-person dialogue were prepared. These scripts were arranged so as to resemble in written form an actual dialogue which might take place when a person is retaining delivery service. An example of a script used in this program is contained in Appendix A5.

B. School demonstration telephones provided by the Wisconsin Telephone Company were used.[6] These telephones have a manual-operated control board with both a regular-dial and a touch-tone phone connected to it. T could manipulate the controls to provide a ring, dial tone, busy signal, etc. S heard his own voice and the voice on the receiving end exactly as he would hear them using a real telephone.

C. Five 3" x 5" flashcards each containing the name and telephone number of one of the 5 businesses to be called were constructed. This was done so that Ss could concentrate on the verbal components of the task in this phase.

D. A sample data sheet used to record progress in Phase V is presented in Appendix A6.

Teaching Arrangement: During Phase V T and Ss were seated at a rectangular classroom table. T operated the demonstration telephone control board, which was placed on the table in front of her. T also had a copy of the script and a data sheet. One S at a time was given a script, a flashcard with business name and telephone number printed on it, and a demonstration telephone. The receiving telephone was placed in the rear of the classroom behind a room divider. The classroom matron operated this telephone with a copy of the script in hand and spoke as the business person.

Phase VI: Teaching students to arrange the delivery of 5 products or services to the school through use of the yellow pages and the telephone.

Instructional Materials: During Phase VI the following instructional materials were utilized:

A. The City of Madison Telephone Directory (January, 1974) as described in Phase I - Instructional Materials was used in Phase VI.

B. A pencil and a piece of note paper was given to each S for writing down the business names and telephone numbers.

C. An operating telephone provided by the school was used.

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[6] The reader can contact his local telephone company for further information regarding this free service for schools.

D. A sample data sheet used to record results is presented in Appendix A2. Ss names were written on the vertical grid under "Name" and the heading word representing the product or service to be delivered printed horizontally across the top of the page.

Teaching Arrangement: Each S was seated individually at a rectangular teacher's desk. An operating telephone, a City of Madison Telephone Directory, a piece of paper, and a pencil were on the top of the desk. T was seated on a chair to the rear of S, a point from which she could hear S's conversation and mark his responses on the data sheet.

## Graphs and Consequation

Individual graphs were constructed for each S. These graphs depicted the number of correct responses across trials or, in some parts, the total time required to perform a cued response during a trial for each part of each phase of the program. Social praise was dispersed immediately after each correct response. In addition, during Phases I and III a large chart was placed on the bulletin board with Ss' names and the heading words to be located printed on it. The first time during testing S located a heading word within 1 minute 30 seconds he received a green star to place on the chart. On the second consecutive occasion that S located the word within the time limit, he received a gold star. Finally, during Phase VI the strongest reinforcer was the actual pizza, groceries, flowers, laundry, and dry cleaning delivered to the Ss at school.

## Teaching Design and Procedures

In this program Phase VI represents the specific terminal objective which Ss are to meet. Phase I - V delineate a series of less complex responses which are necessary for the performance of this objective (Phase VI). The parts within each phase are also ordered serially and are assumed necessary for the mastery of the objective for each individual phase. The instructional program was organized as follows:

A. Baseline Phase VI
B. Baseline Phase I
C. Teach Phase I, Parts 1 - 13
D. Test Phase I
E. Baseline Phase II
F. Teach Phase II, Parts 1 - 3
G. Test Phase II
H. Baseline Phase III
I. Teach Phase III, Parts 1 - 13
J. Test Phase III
K. Baseline Phase IV
L. Teach Phase IV, Parts 1 - 6

M. Test Phase IV
N. Baseline Phase V
O. Teach Phase V
P. Test Phase VI

Phase VI: Teaching students to arrange the delivery of 5 products or services through use of the yellow pages and telephone.

The purpose of Phase VI was to determine whether Ss could chain a series of less complex responses in order to perform the objective of Phase VI. Before any teaching procedures were employed in Phases I - V, Ss were evaluated to determine whether any could meet the objective.

Baseline Procedures - Phase VI: S's ability to arrange the delivery of 5 products or services to the school through use of the yellow pages and telephone was assessed in the following manner: T presented $S_1$ with a telephone book, a piece of paper and a pencil, and an operating telephone. T said: "Here is a telephone book and a telephone. Call up and have (product or service) delivered to school." $S_1$ was required to locate the name of a business that delivered the product or service, call the business on the telephone, and arrange to have the product or service delivered to school. If $S_1$ arranged the delivery of the product or service, T marked a "+" in the appropriate box on the data sheet. If $S_1$ did not arrange the delivery, T marked a "-" on the data sheet. It should be noted that no indication of accuracy was provided. T continued this procedure until $S_1$ had an opportunity to respond to directions relating to the 5 businesses located under heading words in Set I. The same procedure was repeated with the remaining 4 Ss until each had the opportunity to respond to the 5 directions.

Phase I: Teaching Ss the location of heading and guide words in the yellow pages from a printed cue.

Phase I was divided into 4, 7, 10, or 13 parts depending on the heading word and its location in the yellow pages. In order to locate a heading word, a method of alphabetical attack was necessary. The parts in Phase I delineate this strategy. Because it was expected that Ss would become proficient at this method of attack through repetition, the objective of Phase I was not to measure progress in developing the method of attack (i.e., to achieve errorless responding for 3 consecutive trials on Parts 1 - 13) but rather to measure the efficiency with which Ss could apply this method to locate heading words. It was arbitrarily decided that the criterion for a correct response was locating a heading word within 1 minute and 30 seconds.

The author felt that if Ss took any longer than this, they were not using an efficient method of attack. Included in this time was an allowance for the physical disabilities involved. A test-teach-test design was chosen to assess the Ss during this phase because it efficiently measures the rate response required and because it frees the teacher to implement the procedure. Phase I was organized as follows:

A. Baseline (i.e., Test) Set I
B. Baseline Set II
C. Teach Set I
D. Test Set I
E. Baseline Set II
F. Teach Set II
G. Test Set II

Baseline Procedures: Each S's ability to label the letters of the printed heading words and to distinguish between a heading word and a guide word was obtained prior to instruction. Baseline measures were obtained as follows: T presented the first heading word of Set I to Ss and said, "Find this word in the yellow pages." T began timing at the moment the verbal cue was terminated. When Ss located the word, they raised their hands and T recorded the time of each S's response. If S was pointing to the heading word and the time was within 1 minute 30 seconds a "+" was marked in the appropriate box on the data sheet next to the time. If S was pointing to the heading word and the time was not within 1 minute 30 seconds, a "-" was marked on the data sheet. If S was not pointing to the heading word regardless of time, a "-" was marked on the data sheet. Ss were given up to 4 minutes to complete their response. It should be noted that no indication of accuracy was provided. T proceeded in this manner until all 10 heading words of Sets I and II had been presented to Ss.

Teaching Procedure - Set I: If baseline measures suggested Ss could not locate heading words in Set I within the time limit, the following procedure was implemented:

Part 1: Teaching Ss to label the first letter of a heading word from a printed cue.

T presented Ss with the first heading word from Set I and said, "What is the first letter of this word?" Ss were required to respond in unison with the appropriate letter name. T provided Ss with appropriate verbal praise and marked a "+" for each S in the appropriate boxes on the data sheet.

### Part 2: Teaching Ss to locate the section of the yellow pages corresponding to the first letter of the word.

T said: "Find the ___ section of the yellow pages. Ss were required to open the yellow pages to the appropriate section as marked by an alphabetical tab marker. If S correctly pointed to the section, T provided S with appropriate verbal praise ("Great, good job, etc.") and marked a "+" in the appropriate box on the data sheet. For incorrect responses, T opened the telephone book from the front cover to the appropriate section. T pointed to the alphabetical tab marker which indicated the correct section and said, "This is the ___ section of the yellow pages; what section is it?" S was required to respond with the appropriate name of that section. T closed the telephone book, repeated the cue, and had S imitate the procedure of finding that particular section. If S pointed to the correct section the second time, T provided appropriate verbal praise ("Fine, that's better, etc.,") but recorded a "-" on the data sheet.

### Part 3: Teaching Ss to locate the first guide word in the yellow pages corresponding to the first letter of the word.

T said: "Find the first guide word at the top of the page that begins with ___." S was required to point to the first guide word that began with the first letter of the printed heading word cue. If S pointed to the correct guide word, T provided appropriate verbal praise and marked a "+" in the appropriate box on the data sheet. For incorrect responses, T modeled the correct response by turning to the ___ section as marked by the alphabetical tab marker. T scanned the top of the page (and the following page if necessary) until T located the first guide word beginning with the first letter of the printed heading word cue. T pointed to the guide word and said, "This is the first guide word that begins with ___; where is the first guide word that begins with ___?" S was required to point to the guide word. T returned the page to the ___ section as marked by the alphabetical tab marker, repeated the cue, and had S imitate the procedure of finding the guide word. If S correctly located the guide word the second time, T provided appropriate verbal praise, but recorded a "-" on the data sheet.

### Part 4 - Teaching Ss to locate the first heading word on that page corresponding to the first letter of the word.

T said, "Point to the first heading word on that page that begins with ___." S was required to point to the first heading word on that page that began with the first letter of the printed heading word cue. If S pointed to the correct heading word, T said, "Is that this word?" (as she pointed to the printed heading word cue). If it was the word and S said "Yes," T provided appropriate verbal praise and marked a "+" in the appropriate box on the data sheet. If it was not the word, and S said "No," T said, "No, it is not the word" and marked a "-" on the data sheet. T then proceeded to Step 5. For incorrect responses, T modeled the correct response by opening the yellow pages to the page with the first guide word that begins with the first letter of the printed heading word cue (found in Step 3). T scanned the columns (down and up, left to right) until T found the first heading word that began with the first letter of the printed heading word cue. T pointed to the heading word and said, "This is the first heading word that begins with __; where is the first heading word that begins with __?" S was required to point to the heading word. T returned the telephone book to S (leaving it on the same page), repeated the cue, and had S imitate this scanning procedure. If S pointed to the correct heading word the second time, T said, "Is that this word?" (as T pointed to the printed heading word cue). If it was the word and S said "Yes," T provided social praise but marked a "-" in the appropriate box on the data sheet. If it was not the word and S said "No," T said, "No, it is not the word," and marked a "-" on the data sheet. T then proceeded to Step 5.

### Part 5 - Teaching Ss to label the first two letters of a heading word from a printed cue.

T said, "What are the first two letters in this word?" (while T held up the flashcard with the heading word printed on it). Ss were required to respond in unison with the first two letters of the word. T provided Ss with verbal praise for correct responses and marked a "+" for each S in the appropriate boxes on the data sheet.

### Part 6 - Teaching Ss to locate the first guide word in the yellow pages corresponding to the first two letters of the word.

T said, "Find the first guide word at the top of the page that begins with __." S was required to point to the first guide word that began with the first two letters of the printed heading word cue. If S pointed to the correct guide word, T provided verbal reinforcement and marked a "+" in the appropriate box on the data sheet.

For incorrect responses, T modeled the correct response as in Step 3. T began the modeling from the page on which the first heading word that began with __ was located (Step 4).

Part 7 - Teaching Ss to locate the first heading word on that page corresponding to the first two letters of the word.

T said, "Point to the first heading word on that page that begins with _ _." S was required to point to the first heading word on that page that began with the first two letters of the printed heading word cue. If S pointed to the correct heading word, T proceeded as in Step 4. T began the modeling on the page with the guide word that began with the first two letters of the printed heading word cue (found in Step 6).

Part 8 - Teaching Ss to label the first three letters of a heading word from a printed cue.

T said, "What are the first three letters in this word?" (while T held up the flashcard with the heading word printed on it). Ss were required to respond in unison with the first three letters of the word. T provided Ss with appropriate verbal praise and marked a "+" for each S in the appropriate boxes on the data sheet.

Part 9 - Teaching Ss to locate the first guide word in the yellow pages corresponding to the first three letters of the word.

T said, "Find the first guide word at the top of the page that begins with _ _ _." S was required to point to the first guide word that began with the first three letters of the printed heading word cue. If S pointed to the correct guide word, T provided verbal reinforcement and marked a "+" in the appropriate box on the data sheet. For incorrect responses, T modeled the correct response as in Step 3. T began the modeling from the page on which the first heading word that began with _ _ is located (Step 7).

Part 10 - Teaching Ss to locate the first heading word on that page corresponding to the first three letters of the word.

T said, "Point to the first heading word on that page that begins with _ _ _." S was required to point to the first heading word on that page that began with the first three letters on the printed heading word cue. If S pointed to the correct heading word, T proceeded as in Step 4. For incorrect responses T modeled the correct response as in Step 4. T began the modeling on the page with the guide word that began with the first three letters of the printed heading word cue (found in Step 9).

Part 11 - Teaching Ss to label the first four letters of a heading word from a printed cue.

T said, "What are the first four letters of this word?" (while T held up the flashcard with the heading word printed on it). Ss were required to respond in unison with the first four letters of the word. T provided Ss with appropriate verbal praise and marked a "+" for each S in the appropriate boxes on the data sheet.

Part 12 - Teaching Ss to locate the first guide word in the yellow pages corresponding to the first four letters of the word.

T said, "Find the first guide word at the top of the page that begins with _ _ _ _." S was required to point to the first guide word that began with the first four letters of the printed heading word cue. If S pointed to the correct guide word, T provided social praise and marked a "+" in the appropriate box on the data sheet. For incorrect responses, T modeled the correct response as in Step 3. T began the modeling from the page on which the first heading word that began with _ _ _ is located (Step 10).

Part 13 - Teaching Ss to locate the first heading word on that page corresponding to the first four letters of the word.

T said, "Point to the first heading word on that page that begins with _ _ _ _." S was required to point to the first heading word on that page that began with the first four letters of the printed heading word cue. If S pointed to the correct heading word, T proceeded as in Step 3. For incorrect responses T modeled the correct response as in Step 3. T began the modeling on the page with the guide word that began with the first four letters of the printed heading word cue (found in Step 12).

Testing Procedures - Set I - T again used the Baseline Procedures described in Phase I and recorded the performance of Ss on Set I. Testing was done after each teaching set (i.e., after 1 teaching trial on each of the 5 heading words). If S made a criterion response, T provided appropriate verbal praise and place a green star in the appropriate box on the classroom chart. The heading word was then put into the Retest Set for that S. If S's response did not reach criterion, the heading word was put in the Reteach Set for that S. The following day Ss either repeated the teaching procedure on words in their Reteach Set or were retested on words in their Retest Set. Each S was given a gold star for his second consecutive correct response. This test-teach-test procedure was repeated until an S located each heading word in Set I on two consecutive trials within 1 minute 30 seconds. Note: It must be emphasized that Ss were not required to follow a step-by-step procedure in locating the heading words during testing. Some Ss did need to use the procedure, while others began to rely solely on guide word cues or other strategies to locate words which also was a totally acceptable response.

Baseline Procedures - Set II: T again used the Baseline Procedures described in Phase I and recorded the performance of Ss on Set II. This baseline score provided T with a measure of generalization between taught and untaught heading words.

Teaching Procedures - Set II: If baseline measures suggested Ss could not locate heading words in Set II within the prescribed time limit, T again used the Teaching Procedures - Set I described in Phase I.

Testing Procedures - Set II: T again used the Testing Procedures - Set I described in Phase I. It should be noted that if S made a criterion response on any of the heading words during Baseline, this word was put into the Retest Set without employing Teaching Procedures.

### Phase II: Teaching Ss to name heading words which correspond to statements concerning the function of community services.

Phase II was divided into 3 parts and was designed to teach Ss the correct heading words to locate when they desired a particular product or service to be delivered. In Part 1 Ss were taught to label the 10 heading words which they located in Phase I. In Part 2 Ss were read a statement concerning the function of community services and were to mark on a worksheet the heading word which corresponded to this statement from a choice of 3. In Part 3 the same statements were read, but Ss were required to name the corresponding heading word without any visual or verbal cues. The instructional sequence for Phase II was as follows:

A. Baseline Phase II
B. Baseline Part 1
C. Teach Part 1 to criterion
D. Baseline Part 2

E. Teach Part 2 to criterion
F. Baseline Part 3
G. Teach Part 3 to criterion

*Baseline Procedures - Phase II:* Baseline measures of Phase II were obtained as follows: *T* said to $S_1$, "Name the heading word under which you will find the name of a business that will *(function of business)*." (See *Phase II - Teaching Arrangements* for exact statements used) $S_1$ was required to name the heading word (exactly as it appeared in the yellow pages) which corresponded to the statement concerning the function of community services. If $S_1$ correctly named the heading word, *T* marked a "+" in the appropriate box on the data sheet. For incorrect responses, *T* marked a "-" on the data sheet. No indication of accuracy was provided. *T* proceeded in this manner until $S_1$ had responded to all 10 statements. *T* then read the 10 statements to $S_2$, $S_3$, etc., until all 10 statements had been read and responded to by each *S* on two occasions.

*Part 1 - Teaching Ss to label 10 heading words as found in the yellow pages*.

*Baseline Procedures - Part 1:* Baseline measures of Phase II, Part 1, were obtained as follows: *T* presented the first heading word which was printed on a flashcard to $S_1$ and said, "What word is this?" If $S_1$ labeled the word correctly, a "+" was marked in the appropriate box on the data sheet. If $S_1$ labeled the word incorrectly, a "-" was marked on the data sheet. It should be noted that no indication of accuracy was provided. *T* then presented the second heading word to $S_2$, the third heading word to $S_3$, etc. until each *S* had responded to each of the 10 words on 2 consecutive occasions. Words that *Ss* did not label correctly in 2 consecutive baseline trials were put into a *Teaching Set*.

*Teaching Procedures - Part 1:* If baseline measures suggested *Ss* could not label the heading words, the following procedure was implemented: *T* presented the first heading word to $S_1$ and said, "What word is this?" If $S_1$ correctly labeled the heading word, *T* provided appropriate verbal praise and recorded a "+" in the appropriate box on the data sheet. If $S_1$ labeled the word incorrectly, *T* marked a "-" on the data sheet and said, "No! This word is *(correct label)*." *T* then repeated the cue, "What word is this?" If $S_1$ labeled the word correctly, *T* provided appropriate verbal praise but did not record a "+" on the data sheet. *T* then presented the second heading word to $S_2$, the third heading word to $S_3$, etc. This procedure was repeated until each *S* correctly labeled each heading word on 2 consecutive occasions.

*Part 2* - *Teaching Ss to mark heading words which correspond to statements concerning the function of community services.*

*Baseline Procedures - Part 2*: Baseline measures of Phase II, Part 2, were obtained as follows: *T* presented *Ss* with a written worksheet. *T* said, "Here is a worksheet for you to do. I will read a statement and then read the three heading words printed on your paper. Mark the heading word which you think best matches my statement. I will read each statement twice." *T* then read the first statement, "Question number __. Mark the heading word under which you will find the name of a business that will (*function of business*)." *T* then read the three heading words listed for question number __. *Ss* were required to mark the correct heading word from a choice of three which corresponded to *T*'s statement concerning the function of the business. *T* proceeded in this manner until *Ss* had responded to all 10 statements. *T* corrected the papers and recorded the number correct in the appropriate space on the data sheet. *T* repeated this procedure on the second consecutive baseline trial, whereupon baseline was terminated.

*Teaching Procedures - Part 2*: If baseline measures suggested *Ss* could not mark heading words which correspond to statements concerning the function of community services, the following procedure was implemented: *T* presented $S_1$ with the corrected worksheet. *T* said, "$S_1$, look at question number __." *T* then repeated the cue for that question, "Mark the heading word under which you will find the name of a business that will (*function of business*)." If $S_1$ corrected himself, *T* said, "Yes, (*Heading word*) is the heading word under which you will find the name of a business that will (*function of business*)." If $S_1$ made an incorrect response the second time, *T* said, "No! (*Heading word*) is the heading word under which you will find the name of a business that will (*function of business*)." *T* repeated the cue. $S_1$ made a correct response and *T* said, "Find, thank you." *T* repeated this procedure with $S_2$, $S_3$, etc., until each error was corrected. On the following day *T* readministered the worksheet. *T* corrected the worksheets and any errors were corrected as described above. The procedure was repeated until an *S* completed 2 worksheets without an error on 2 consecutive occasions (including *Baseline* worksheet).

*Part 3* - *Teaching students to name heading words which correspond to statements concerning the function of community services.*

*Baseline Procedures - Part 3*: *T* again used the *Baseline Procedures* described in Phase II.

Teaching Procedures - Part 3: If baseline measures suggested Ss could not name heading words which correspond to statements concerning the function of community services, the following procedure was implemented: T said to $S_1$, "Name the heading word under which you will find the name of a business that will (function of business)." $S_1$ was required to name the heading word (exactly as it appeared in the yellow pages) which corresponded to the statement concerning the function of the community service. If $S_1$ correctly named the heading word, T provided appropriate verbal praise and recorded a "+" in the appropriate box on the data sheet. For incorrect responses, T said, "No!" repeated the cue, "Name the heading word under which you will find the name of a business that will (function of business)" and modeled the correct response, "(Heading word)." T repeated the cue again. If $S_1$ correctly imitated the model, T provided appropriate verbal praise but marked a "-" on the data sheet. T continued this procedure until $S_1$ had responded to all 10 statements. T then read the 10 statements to $S_2$, $S_3$, etc. This procedure was repeated until an S responded correctly to each of the 10 statements on 2 consecutive occasions.

Phase III - Teaching Ss the location of heading and guide words in the yellow pages from a verbal cue.

The purpose of Phase III was to teach Ss to locate the 10 heading words in Sets I and II in Phase I, but without a visual cue. The instructional program (Design, Baseline Procedures, Teaching Procedures, and Testing Procedures) was carried out exactly as Phase I, and the reader is directed to Phase I when implementing Phase III. The only modification made was that T did not present a flashcard with the heading word printed on it to Ss. In addition, there is a minor language change: In Parts 1, 5, 8, and 11 of Phase III the phrase "the heading word, (Heading word)" is substituted for "this word" as it appeared in Parts 1, 5, 8, and 11 of Phase I.

Phase IV: Teaching Ss to locate the telephone numbers of five businesses which do deliver products and services in the community and to write the names of the businesses and the telephone numbers on a piece of paper.

Phase IV was divided into 6 parts and was designed to teach Ss to discriminate whether or not a business had a delivery service. In addition, Ss were taught to write the name of the business and its telephone number on a piece of paper before placing a telephone call. The five types of businesses chosen were those located under the heading words in Set I: 1) a cleaners, 2) a florist, 3) a grocery store, 4) a laundry, and 5) a pizza restaurant. These products and services were felt to be the most reinforcing to Ss and also were easiest to secure for delivery to the school.

In Part 1 Ss were taught to label 10 select sight words commonly used in the yellow pages to indicate that a business does have delivery service. In Part 2 Ss were taught to scan the section denoted by the heading word to locate such a delivery sight word. In Parts 3 - 6 Ss were taught the procedure for locating the business name and telephone number and writing these on a piece of paper. The instructional sequence for Phase IV was as follows:

A. Baseline Phase IV
B. Baseline Part 1
C. Teach Part 1 to criterion
D. Teach Parts 2 - 6 to criterion[7]
E. Test Phase IV

Baseline Procedures - Phase IV: Baseline measures of Phase IV were obtained as follows: T said to Ss, "Find the name and telephone number of a business that will (function of business) and write them on a piece of paper." Ss were required to locate the heading word corresponding to the function named, locate a business name in the column underneath the heading word which did deliver its product or service (as denoted by a delivery sight word), and write the business name and telephone number on a piece of paper. It should be noted that there was more than one acceptable response for there were numerous businesses within a specific column which did deliver. If an S correctly wrote the name and telephone number of a business which provided delivery service, T marked a "+" in the appropriate box on the data sheet. For incorrect responses, T marked a "-" on the data sheet. It should be noted that no indication of accuracy was provided. T proceeded in this manner until Ss had responded to all 5 directions relating to 5 businesses denoted by the heading words in Set I on 2 consecutive occasions.

### Part 1 - Teaching Ss to label 10 select sight words commonly found in the yellow pages that indicate delivery service.

Baseline Procedures - Part 1: Baseline measures of Phase IV, Part 1 were obtained as follows: T presented the first delivery sight word to $S_1$ and said, "What word is this?"

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[7] The original baseline showed that Ss were not able to perform parts 2 - 6; therefore, they were not rebaselined. Parts 2 - 6 were taught simultaneously because they comprised a self-contained sequence.

If $S_1$ labeled the word correctly, a "+" was marked in the appropriate box on the data sheet. If $S_1$ labeled the word incorrectly, a "-" was marked on the data sheet. No indication of accuracy was provided. T then presented the second word to $S_2$, the third word to $S_3$, etc., until each S had responded to each of the 10 words on 2 consecutive occasions. Words that Ss did not label correctly in 2 consecutive baseline trials were put into individual *Teaching Sets*.

*Teaching Procedures - Part 1*: If baseline measures suggested Ss could not label the delivery sight words, the following procedure was implemented: T presented the first delivery sight word to $S_1$ and said, "What word is this?" If $S_1$ correctly labeled the sight word, T provided appropriate verbal praise and recorded a "+" in the appropriate box on the data sheet. If $S_1$ labeled the word incorrectly, T marked a "-" on the data sheet and said, "No! This word is (*correct label*)." T then repeated the cue, "What word is this?" If $S_1$ labeled the word correctly, T provided appropriate verbal praise but did not record a "+" on the data sheet. T presented the second delivery sight word to $S_2$, the third sight word to $S_3$, etc. This procedure was repeated until each S correctly labeled each delivery sight word on 2 consecutive occasions.

*Part 2* - *Teaching Ss to scan the column under a heading word from a verbal cue and to locate one of the ten sight words indicating that the business does deliver its product or service*.

*Teaching Procedures - Part 2*: If baseline measures of Phase IV suggested Ss could not locate a business name in the column underneath the heading word which did provide delivery service and write the business name and telephone number on a piece of paper, the following procedure was implemented (Parts 2 - 6): T said to Ss, "Find the heading word (*heading word*). Point to a word or words in the (*heading word*) section which tell us that the business delivers." Ss were required to locate the correct heading word in the yellow pages and to point to a sight word in that section that indicated a business delivered its product or service. If an S correctly located a delivery sight word in the correct section, T provided appropriate verbal praise and recorded a "+" in the appropriate box on the data sheet. For incorrect responses T modeled the correct response by pointing to the heading word at the beginning of the section. T scanned the columns of that section until T located a delivery sight word. T pointed to the sight word and said, "This word is (*delivery sight word*) and it tells us that the business delivers its product or service; what word is this?" S was required to label the sight word. T returned the telephone book to S, repeated the cue, and had S imitate this procedure. If S pointed to a delivery sight word the second time, T provided appropriate verbal praise but marked a "-" on the data sheet. T repeated this procedure until each S's response was verified or corrected. T then proceeded to Part 3.

Part 3 - Teaching Ss to locate the name of the business that offers the delivery service.

Teaching Procedures - Part 3: T said to Ss, "Point to the name of the business that delivers in that ad." Ss were required to point to the name of the business in the same ad as the delivery sight word (located in Part 2). If an S pointed to the correct business name, T provided appropriate verbal praise and recorded a "+" in the appropriate box on the data sheet. For incorrect responses, T said "No!" pointed to the name of the business and said, "This is the name of the business that delivers in this ad." T repeated the cue, "Point to the name of the business that delivers in that ad." If S pointed to the business name the second time, T provided appropriate verbal praise, but marked a "-" on the data sheet. T repeated this procedure until each S's response was verified or corrected. T then proceeded to Part 4.

Part 4 - Teaching Ss to write the name of the business on a piece of paper.

Teaching Procedures - Part 4: T said to Ss, "Write the name of the business on a piece of paper." Ss were required to write the name of the business (located in Step 3) exactly as it appeared in the yellow pages on a piece of paper. If an S wrote the business name correctly, T provided appropriate verbal praise and recorded a "+" in the appropriate box on the data sheet. If an S did not copy the business name correctly, T said, "No, that is not right" and erased the incorrect business name. T then said, "Watch me." T then copied the business name while S watched. T then said, "Now you copy the name beside mine." If S matched T's written model, T provided appropriate verbal praise but marked a "-" on the data sheet. T repeated this procedure until each S's response was verified or corrected. T then proceeded to Part 5.

Part 5 - Teaching Ss to locate the telephone number of the business that offers the delivery service.

Teaching Procedures - Part 5: T said to Ss, "Point to the telephone number of the business that delivers in that ad." Ss were required to point to the telephone number of the business in the same ad as the delivery sight word (located in Part 2). If an S pointed to the correct telephone number, T provided appropriate verbal praise and recorded a "+" in the appropriate box on the data sheet. For incorrect responses, T said, "No!" pointed to the telephone number of the business and said, "This is the telephone number of the business that delivers in that ad." T repeated the cue, "Point to the telephone number of the business that delivers in that ad." If an S pointed to the telephone number the second time, T provided appropriate verbal praise but marked a "-" on the data sheet. T repeated this procedure until each S's response was verified or corrected. T then proceeded to Part 6.

Part 6 - Teaching Ss to write the telephone number of the business on a piece of paper next to its name.

Teaching Procedures - Part 6: T said to Ss, "Write the telephone number of the business on the piece of paper next to its name." Ss were required to write the telephone number of the business (located in Step 5) exactly as it appeared in the yellow pages on the piece of paper next to its name. If an S wrote the telephone number correctly, T provided appropriate verbal praise and recorded a "+" in the appropriate box on the data sheet. If an S did not copy the telephone number correctly, T said, "No, that is not right" and erased the incorrect telephone number. T then said, "Watch me." T then copied the telephone number while S watched. T then said, "Now you copy the telephone number beside mine." If S matched T's written model, T provided appropriate verbal praise but marked a "-" on the data sheet. T continued this procedure until each S's response was verified or corrected.

T repeated the Teaching Procedures for Parts 2 - 6 until each S had made 5 correct responses on 2 consecutive occasions.

Testing Procedures - Phase IV: T again used the Baseline Procedures described in Phase IV and recorded each S's performance on two trials of responding to the 5 directions relating to the 5 businesses denoted by heading words in Set I.

Phase V: Teaching students the verbal responses necessary to call five businesses on the telephone and have products or services delivered.

The purpose of Phase V was to teach Ss what to say when they were speaking on the telephone to a business and wished to have a product or service delivered. Phase V was divided into 5 or 6 parts depending upon whether S was requesting the delivery of a service (dry cleaning, laundry) or a product (flowers, groceries, pizza). The five types of businesses in Phase V were again those located under the heading words in Set I. In Parts 1 - 6 Ss were to read responses from a prepared script which anticipated the type of information a business might request and the type of information S would have to provide to secure delivery service. There were five scripts used in Phase V--each specific to one of the five businesses. The instructional sequence for Phase V was as follows:

A. Baseline Phase V
B. Teach Parts 1 - 6 to criterion

Baseline Procedures - Phase V: S's ability to label statements as they occurred in printed scripts in order to make the verbal responses necessary to call a business and arrange for delivery service was assessed in the following manner: T presented Script I and a flashcard with a corresponding business name and telephone number printed on it to $S_1$ and said, "I have given you a card and a script which you will use when talking to a business on the telephone. Your script is for a (type of business) and its name and telephone number are printed on the card. Dial the number on the telephone and read your part which is underlined. M (matron) will read the part of the business person. I will not help you with words you do not know, so do the best you can." $S_1$ was required to dial the correct telephone number and read his part in response to the verbal cues given by M on the receiving end of the telephone. If $S_1$ read the statements in Part 1 without error, T marked a "+" in the appropriate box on the data sheet. If $S_1$ did make an error reading the statements in Part 1, T marked a "-" on the data sheet. Pauses or self-corrected errors were not counted as incorrect. It should be noted that no indication of accuracy was provided. T continued in this manner until $S_1$ had read the entire script (Parts 1 - 6). T then gave Script II to $S_2$, Script III to $S_3$, etc. T repeated this procedure until each S had the opportunity to label the statements in his particular script on 2 occasions.

Teaching Procedures - Parts 1 - 6: If baseline measures suggested Ss could not make the verbal responses necessary to call businesses on the telephone and have products or services delivered, the following procedure was implemented:

T presented Script I and a flashcard with a corresponding business name and telephone number printed on it to $S_1$ and said, "I have given you a card and a script which you will use when talking to a business on the telephone. Your script is for a (type of business). The name of a (type of business) and its telephone number are printed on the card. Dial the number of the business and read your part which is underlined. If $S_1$ labeled each statement in each part of the script, a "6" (or in some cases, a "5") was marked beside the "# correct" on the data sheet and $S_1$ was given appropriate verbal praise. If $S_1$ made a labeling error or a sequence error, he was stopped immediately, a "-" was marked in the appropriate box on the data sheet, and the following procedures were implemented:

## Sequence Errors

A. If $S_1$ did not label the statements in the appropriate top line to bottom line - left to right sequence, T intervened as soon as $S_1$ made an error in the labeling sequence and said, "No, that's not right. Don't skip any words. Start that part over." If $S_1$ relabeled the statements in the appropriate statements in the appropriate sequence, T said, "That's better, you didn't skip any words that time."

B. If $S_1$ again made an error in the labeling sequence, T intervened as soon as $S_1$ made the error and said, "No, don't skip any words." T then modeled the correct labeling sequence from the beginning of the part in which the error occurred to the end of that part. Then T said to $S_1$, "Now you read the part." If $S_1$ imitated T's model by labeling the statements in the part correctly, T dispensed appropriate verbal praise.

## Labeling Errors

If $S_1$ labeled a statement in Script I incorrectly, T intervened as soon as the error was made and said, "No, that sentence is wrong, read the sentence again." If $S_1$ labeled the statement correctly, T said, "That's better, now go back and start that part over again." That is, $S_1$ was requested to return to the initial word in the part where the error occurred and relabel all the statements in that part. If, after the initial error $S_1$ did not relabel the statement correctly, T intervened and said, "No, that sentence is (correct statement)." T then directed $S_1$ to return to the initial word in the part and relabel all the statements in that part. If $S_1$ imitated T's model by labeling the statements in the part correctly, T dispensed appropriate verbal praise.

These procedures were followed until each S correctly labeled the statements in his particular script in the appropriate order on 2 consecutive occasions.

Phase VI: Teaching students to arrange the delivery of 5 products or services to the school through use of the yellow pages and telephone.

The purpose of Phase VI was to evaluate whether Ss had mastered the series of less complex responses taught in Phases I - V which were necessary for the performance of the objective of Phase VI. The phase involved only the testing of the objective.

Testing Procedures - Phase VI: T again used the Baseline Procedures described in Phase VI. It should be noted that the school year ended before Ss had the opportunity to learn to read all 5 scripts, which initially was the goal of the program. Therefore, during testing, T explained that on 4 of the 5 directions Ss were to pretend that they were going to call as T requested. T counted as correct a response in which an S carried out the procedure through to the ringing of the telephone on the receiving end. S used the script which he was taught to read for the remaining direction and carried out this direction to its completion, i.e., this response was counted correct only if the product or service was actually delivered to school.

## RESULTS

Measures of each S's ability to perform in each of the phases were obtained prior to instruction (baseline), during instruction (teaching), and following instruction (testing). This section delineates the results of these measures.

### Phase I: Teaching Ss the location of heading and guide words in the yellow pages from a printed cue.

The objective of Phase I was to teach Ss to locate 10 select heading words in the yellow pages from a printed cue. Initially Ss were given one opportunity to locate each of the 10 heading words within 1 minute and 30 seconds. During this baseline trial, Ss were required to locate all 10 heading words in order for T to determine prior to instruction if they did have the attack skills necessary to locate heading words.

Heading words not located within the time limit were divided into Teaching Sets I and II. Ss were required to locate all the words in a Teaching Set on 2 consecutive occasions during testing before T determined that they could locate the heading words efficiently.

$S_1$: The performance of $S_1$ is graphically depicted in Figure A-1 and can be summarized as follows:

Baseline Set I: $S_1$ located 0 heading words in Set I within 1 minute 30 seconds in the baseline trial (Figure A-1, Part A).

Baseline Set II: $S_1$ located 3 heading words in Set II within 1 minute 30 seconds in the baseline trial (Figure A-1, Part B).

Teaching Set I: $S_1$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part C).

Testing Set I: $S_1$ achieved criterion on the 5 heading words in Set I after 1 teaching trial (Figure A-1, Part D).

Re-Baseline Set II: $S_1$ achieved criterion on the 5 heading words in Set II after 0 teaching trials (Figure A-1, Part I).

$S_2$: The performance of $S_2$ is graphically depicted in Figure A-1 and can be summarized as follows:

Baseline Set I: $S_2$ located 0 heading words in Set I within 1 minute 30 seconds in the baseline trial (Figure A-1, Part A).

Baseline Set II: $S_2$ located 2 heading words in Set II within 1 minute 30 seconds in the baseline trial (Figure A-1, Part B).

Teaching Set I: $S_2$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part C).

Testing Set I: $S_2$ located 4 heading words in Set I within 1 minute 30 seconds (Figure A-1, Part D).

Teaching Set I: $S_2$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part E).

Testing Set I: $S_2$ achieved criterion on the 5 heading words in Set I after 2 teaching trials (Figure A-1, Part F).

Re-Baseline Set II: $S_2$ located 2 heading words in Set II within 1 minute 30 seconds in the baseline trial (Figure A-1, Part I).

Teaching Set II: $S_2$ located the 5 heading words in Set II following the Teaching Procedures for Set II (Figure A-1, Part J).

Testing Set II: $S_2$ achieved criterion on the 5 heading words in Set II after 1 teaching trial (Figure A-1, Part K).

$S_3$: The performance of $S_3$ is graphically depicted in Figure A-1 and can be summarized as follows:

Baseline Set I: $S_3$ located 0 heading words in Set I within 1 minute 30 seconds in the baseline trial (Figure A-1, Part A).

Baseline Set II: $S_3$ located 3 heading words in Set II within 1 minute 30 seconds in the baseline trial (Figure A-1, Part B).

Teaching Set I: $S_3$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part C).

Testing Set I: $S_3$ located 4 heading words in Set I within 1 minute 30 seconds (Figure A-1, Part D).

Teaching Set I: $S_3$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part E).

Testing Set I: $S_3$ located 4 heading words in Set I within 1 minute 30 seconds (Figure A-1, Part F).

Teaching Set I: $S_3$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part G).

Testing Set I: $S_3$ achieved criterion on the 5 heading words in Set I after 3 teaching trials (Figure A-1, Part H).

Re-Baseline Set II: $S_3$ located 2 heading words in Set II within 1 minute 30 seconds in the baseline trial (Figure A-1, Part I).

Teaching Set II: $S_3$ located the 5 heading words in Set II following the Teaching Procedures for Set II (Figure A-1, Part J).

Testing Set II: $S_3$ achieved criterion on the 5 heading words in Set II after 1 teaching trial (Figure A-1, Part K).

$S_4$: The performance of $S_4$ is graphically depicted in Figure A-1 and can be summarized as follows:

Baseline Set I: $S_4$ located 0 heading words in Set I within 1 minute 30 seconds in the baseline trial (Figure A-1, Part A).

Baseline Set II: $S_4$ located 0 heading words in Set II within 1 minute 30 seconds in the baseline trial (Figure A-1, Part B).

Teaching Set I: $S_4$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part C).

Testing Set I: $S_4$ located 4 heading words in Set I within 1 minute 30 seconds (Figure A-1, Part D).

Teaching Set I: $S_4$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part E).

Testing Set I: $S_4$ located 3 heading words in Set I within 1 minute 30 seconds (Figure A-1, Part F).

Teaching Set I: $S_4$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part G).

Testing Set I: $S_4$ achieved criterion on the 5 heading words in Set I after 3 teaching trials (Figure A-1, Part H).

Re-Baseline Set II: $S_4$ located 3 heading words in Set II within 1 minute 30 seconds in the baseline trial (Figure A-1, Part I).

Teaching Set II: $S_4$ located the 5 heading words in Set II following the Teaching Procedures for Set II (Figure A-1, Part J).

Testing Set II: $S_4$ located 4 heading words in Set II within 1 minute 30 seconds (Figure A-1, Part K).

Teaching Set II: $S_4$ located the 5 heading words in Set II following the Teaching Procedures for Set II (Figure A-1, Part L).

Testing Set II: $S_4$ located 4 heading words in Set II within 1 minute 30 seconds (Figure A-1, Part M).

Teaching Set II: $S_4$ located the 5 heading words in Set II following the Teaching Procedures for Set II (Figure A-1, Part N).

Testing Set II: $S_4$ achieved criterion on the 5 heading words in Set II after 3 teaching trials (Figure A-1, Part O).

$S_5$: The performance of $S_5$ is graphically depicted in Figure A-1 and can be summarized as follows:

Baseline Set I: $S_5$ located 1 heading word in Set I within 1 minute 30 seconds in the baseline trial (Figure A-1, Part A).

Baseline Set II: $S_5$ located 1 heading word in Set II within 1 minute 30 seconds in the baseline trial (Figure A-1, Part B).

Teaching Set I: $S_5$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part C).

Testing Set I: $S_5$ located 4 heading words in Set I within 1 minute 30 seconds (Figure A-1, Part D).

Teaching Set I: $S_5$ located the 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part E).

Testing Set I: $S_5$ located 4 heading words in Set I within 1 minute 30 seconds (Figure A-1, Part F).

Teaching Set I: $S_5$ located 5 heading words in Set I following the Teaching Procedures for Set I (Figure A-1, Part G).

Testing Set I: $S_5$ achieved criterion on the 5 heading words in Set I after 3 teaching trials (Figure A-1, Part H).

Re-Baseline Set II: $S_5$ located 3 heading words in Set II within 1 minute 30 seconds in the baseline trial (Figure A-1, Part I).

Teaching Set II: $S_5$ located the 5 heading words in Set II following the Teaching Procedures for Set II (Figure A-1, Part J).

Testing Set II: $S_5$ achieved criterion on the 5 heading words in Set II after 1 teaching trial (Figure A-1, Part K).

### Phase II: Teaching Ss to name heading words which correspond to statements concerning the function of community services.

The objective of Phase II was to teach Ss the correct heading words to locate when they desired a particular product or service to be delivered. Initially, during the baseline of Phase II, Ss were given 2 opportunities to label each of 10 heading words. During these baseline trials Ss were required to label a heading word correctly on 2 consecutive occasions in order for T to determine that they could name the heading word correctly. When the heading words were not named correctly, Ss were required to receive instruction in Parts 1, 2, and 3 of Phase II. In Part 1, Ss were given 2 opportunities to label each of 10 heading words. During these baseline trials Ss were required to label a heading word correctly on 2 consecutive occasions in order for T to determine that they could label the heading word correctly. When the words not labeled correctly on the baseline trials were put in a Teaching Set, Ss were required to label all the words in the Teaching Set on 2 consecutive occasions before T determined they could label the heading words correctly.

In Part 2, Ss were required to mark the 10 correct heading words on a worksheet which corresponded to statements concerning the function of community services on 2 consecutive occasions before T determined they could mark the corresponding heading words correctly.

Initially, in Part 3, Ss were given 2 opportunities to name 10 heading words which correspond to statements concerning the function of community services. During these baseline trials, Ss were required to name a heading word correctly on 2 consecutive occasions in order for T to determine that they could name the heading word correctly. During the teaching phase, Ss were required to name all 10 corresponding heading words on 2 consecutive occasions before T determined that they could name the heading words correctly.

$S_1$: The performance of $S_1$ is not graphically depicted but can be summarized as follows:

*Baseline Phase II*: $S_1$ named 11 heading words correctly in the 2 consecutive baseline trials.

*Baseline Part 1*: $S_1$ labeled 18 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 1*: $S_1$ reached criterion performance after 2 teaching trials.

*Baseline Part 2*: $S_1$ marked 19 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 2*: $S_1$ reached criterion performance after 1 teaching trial.

*Baseline Part 3*: $S_1$ named 9 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 3*: $S_1$ reached criterion performance after 2 teaching trials.

$S_2$: The performance of $S_2$ is not graphically depicted but can be summarized as follows:

*Baseline Phase II*: $S_2$ named 14 heading words correctly in the two consecutive baseline trials.

*Baseline Part 1*: $S_2$ reached criterion performance in the 2 consecutive baseline trials.

*Baseline Part 2*: $S_2$ reached criterion performance in the 2 consecutive baseline trials.

*Baseline Part 3*: $S_2$ named 19 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 3*: $S_2$ reached criterion performance after 1 teaching trial.

$S_3$: The performance of $S_3$ is not graphically depicted but can be summarized as follows:

*Baseline Phase II*: $S_3$ named 11 heading words correctly in the 2 consecutive baseline trials.

*Baseline Part 1*: $S_3$ labeled 17 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 1*: $S_3$ reached criterion performance after 2 teaching trials.

*Baseline Part 2:* $S_3$ reached criterion performance in the 2 consecutive baseline trials.

*Baseline Part 3:* $S_3$ named 17 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 3:* $S_3$ reached criterion performance after 1 teaching trial.

$S_4$: The performance of $S_4$ is not graphically depicted but can be summarized as follows:

*Baseline Phase II:* $S_4$ named 8 heading words correctly in 2 consecutive baseline trials.

*Baseline Part 1:* $S_4$ labeled 9 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 1:* $S_4$ reached criterion performance after 3 teaching trials.

*Baseline Part 2:* $S_4$ reached criterion performance in the 2 consecutive baseline trials.

*Baseline Part 3:* $S_4$ named 14 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 3:* $S_4$ reached criterion performance after 3 teaching trials.

$S_5$: The performance of $S_5$ is not graphically depicted but can be summarized as follows:

*Baseline Phase II:* $S_5$ named 15 heading words correctly in 2 consecutive baseline trials.

*Baseline Part 1:* $S_5$ labeled 19 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 1:* $S_5$ reached criterion performance after 1 teaching trial.

*Baseline Part 2:* $S_5$ reached criterion performance in the 2 consecutive baseline trials.

*Baseline Part 3:* $S_5$ named 19 heading words correctly in the 2 consecutive baseline trials.

*Teaching Part 3:* $S_5$ reached criterion performance after 1 teaching trial.

Phase III: Teaching Ss the location of heading and guide words in the yellow pages from a verbal cue.

The purpose of Phase III was to teach Ss to locate the 10 heading words in Sets I and II in Phase I but without a visual cue. Initially Ss were given 2 opportunities to locate each of the 10 heading words within 1 minute and 30 seconds. During these baseline trials, Ss were required to locate a heading word on 2 consecutive occasions in order for T to determine that they could locate the heading words correctly. Those heading words not located correctly were divided into Teaching Sets. Ss were required to locate all the words in a Teaching Set on 2 consecutive occasions before T determined that they could locate the heading words correctly.

$S_1$: The performance of $S_1$ is not graphically depicted, but can be summarized as follows:

Baseline Set I: $S_1$ reached criterion performance in the 2 consecutive baseline trials.

Baseline Set II: $S_1$ reached criterion performance in the 2 consecutive baseline trials.

$S_2$: The performance of $S_2$ is not graphically depicted, but can be summarized as follows:

Baseline Set I: $S_2$ reached criterion performance in the 2 consecutive baseline trials.

Baseline Set II: $S_2$ reached criterion performance in the 2 consecutive baseline trials.

$S_3$: The performance of $S_3$ is not graphically depicted but can be summarized as follows:

Baseline Set I: $S_3$ reached criterion performance in the 2 consecutive baseline trials.

Baseline Set II: $S_3$ reached criterion performance in the 2 consecutive baseline trials.

$S_4$: The performance of $S_4$ is not graphically depicted but can be summarized as follows:

Baseline Set I: $S_4$ reached criterion performance in the 2 consecutive baseline trials.

Baseline Set II: $S_4$ located 7 heading words in Set II within 1 minute 30 seconds in the 2 consecutive baseline trials.

Teaching Set II: $S_4$ located the 3 heading words in his Teaching Set following the Teaching Procedures for Set II.

Testing Set II: $S_4$ located 2 heading words in his teaching set within 1 minute 30 seconds.

Teaching Set II: $S_4$ reached criterion performance on the 5 heading words in Set II after 2 teaching trials.

$S_5$: The performance of $S_5$ is not graphically depicted but can be summarized as follows:

Baseline Set I: $S_5$ reached criterion performance in the 2 consecutive baseline trials.

Baseline Set II: $S_5$ reached criterion performance in the 2 consecutive baseline trials.

Phase IV: Teaching Ss to locate the telephone numbers of five businesses which do deliver products and services in the community and to write the name of the businesses and the telephone numbers on a piece of paper.

The purpose of Phase IV was to teach Ss to discriminate whether a business did have delivery service and if it did, to write the business name and telephone number on a piece of paper. Initially, Ss were given 2 opportunities to respond to the 5 directions relating to the 5 businesses denoted by the heading words in Set I. During these baseline trials, Ss were required to respond correctly to the 5 directions on 2 consecutive occasions in order for T to determine that they could locate a business which delivered in the yellow pages and could write its name and telephone number on a piece of paper. In the testing of Phase IV following instruction on Parts 1 - 6, T required 90% correct responding on 2 consecutive trials before Ss could proceed to Phase V.

In the baseline of Part 1, Ss were required to correctly label 10 delivery sight words on 2 consecutive occasions in order for T to determine that they could label the words correctly. When the words not labeled correctly in the baseline trials were divided into Teaching Sets, Ss were required to label the heading words in a Teaching Set on 2 consecutive occasions before T determined that they could label the words in a particular set correctly.

In the teaching of Parts 2 - 6, Ss were required to make 5 (or 6) correct responses on 2 consecutive occasions before T tested them on the objective of Phase IV.

$\underline{S_1}$: The performance of $\underline{S_1}$ is not graphically depicted but can be summarized as follows:

Baseline Phase IV: $\underline{S_1}$ correctly wrote the name and telephone number of a business which did deliver 4 times in the 2 consecutive baseline trials.

Baseline Part 1: $\underline{S_1}$ correctly labeled 13 delivery sight words in the 2 consecutive baseline trials.

Teaching Part 1: $\underline{S_1}$ reached criterion performance after 3 teaching trials.

Teaching Parts 2 - 6: $\underline{S_1}$ reached criterion performance after 2 teaching trials.

Testing Phase IV: $\underline{S_1}$ correctly wrote the name and telephone number of a business which did deliver 10 times in the 2 consecutive testing trials.

$\underline{S_2}$: The performance of $\underline{S_2}$ is not graphically depicted but can be summarized as follows:

Baseline Phase IV: $\underline{S_2}$ correctly wrote the name and telephone number of a business which did deliver 5 times in the 2 consecutive baseline trials.

Baseline Part 1: $\underline{S_2}$ correctly labeled 17 delivery sight words in the 2 consecutive baseline trials.

Teaching Part 1: $\underline{S_2}$ reached criterion performance after 2 teaching trials.

Teaching Parts 2 - 6: $\underline{S_2}$ reached criterion performance after 2 teaching trials.

Testing Phase IV: $\underline{S_2}$ correctly wrote the name and telephone number of a business which did deliver 10 times in the 2 consecutive testing trials.

$\underline{S_3}$: The performance of $\underline{S_3}$ is not graphically depicted but can be summarized as follows:

Baseline Phase IV: $\underline{S_3}$ correctly wrote the name and telephone number of a business which did deliver 4 times in the 2 consecutive baseline trials.

Baseline Part 1: $\underline{S_3}$ correctly labeled 16 delivery sight words in the 2 consecutive baseline trials.

Teaching Part 1: $\underline{S}_3$ reached criterion performance after 3 teaching trials.

Teaching Parts 2 - 6: $\underline{S}_3$ reached criterion performance after 2 teaching trials.

Testing Phase IV: $\underline{S}_3$ correctly wrote the name and telephone number of a business which did deliver 10 times in the 2 consecutive testing trials.

$\underline{S}_4$: The performance of $\underline{S}_4$ is not graphically depicted but can be summarized as follows:

Baseline Phase IV: $\underline{S}_4$ correctly wrote the name and telephone number of a business which did deliver 3 times in the 2 consecutive baseline trials.

Baseline Part 1: $\underline{S}_4$ correctly labeled 4 delivery sight words in the 2 consecutive baseline trials.

Teaching Part 1: $\underline{S}_4$ reached criterion performance after 4 teaching trials.

Teaching Parts 2 - 6: $\underline{S}_4$ reached criterion performance after 2 teaching trials.

Testing Phase IV: $\underline{S}_4$ correctly wrote the name and telephone number of a business which did deliver 9 times in the 2 consecutive testing trials.

$\underline{S}_5$: The performance of $\underline{S}_5$ is not graphically depicted but can be summarized as follows:

Baseline Phase IV: $\underline{S}_5$ correctly wrote the name and telephone number of a business which did deliver 2 times in the 2 consecutive baseline trials.

Baseline Part 1: $\underline{S}_5$ correctly labeled 5 delivery sight words in the 2 consecutive baseline trials.

Teaching Part 1: $\underline{S}_5$ reached criterion performance after 4 teaching trials.

Teaching Parts 2 - 6: $\underline{S}_5$ reached criterion performance after 2 teaching trials.

Testing Phase IV: $\underline{S}_5$ correctly wrote the name of a business which did deliver 10 times in the 2 consecutive testing trials.

### Phase V: Teaching Ss the verbal responses necessary to call five businesses on the telephone and have products or services delivered.

The objective of Phase V was to teach *Ss* what to say when they were speaking on the telephone and wished to have a product or service delivered. *Ss* met the objective when they demonstrated they could label statements as they occurred in a prepared script. Initially, *Ss* were requested to label all the statements in their particular script on 2 consecutive occasions. It was determined that if *Ss* could label the statements in each part of their scripts on 2 consecutive occasions, they would be considered sufficiently proficient to proceed to Phase VI. The performances of *Ss* are not graphically depicted but can be summarized as follows:

#### Baseline:

$S_1$ - On trial 1 $S_1$ correctly labeled the statements in 2 parts of 6 total parts in the script for grocery delivery. On trial 2 $S_1$ labeled statements in 2 parts correctly.

$S_2$ - On trial 1 $S_2$ correctly labeled the statements in 5 parts of 5 total parts in the script for dry cleaning delivery service. On trial 2 $S_2$ labeled statements in 5 parts correctly.

$S_3$ - On trial 1 $S_3$ correctly labeled the statements in 1 part of 5 total parts in the script for laundry delivery service. On trial 2 $S_3$ labeled statements in 2 parts correctly.

$S_4$ - On trial 1 $S_4$ correctly labeled the statements in 1 part of 6 total parts in the script for pizza delivery. On trial 2 $S_4$ labeled statements in 1 part correctly.

$S_5$ - On trial 1 $S_5$ correctly labeled the statements in 2 parts of 6 total parts in the script for flower delivery. On trial 2 $S_5$ labeled statements in 3 parts correctly.

#### Teaching:

$S_1$ - $S_1$ reached criterion performance after 4 teaching trials.

$S_2$ - Implementation of the Phase V teaching procedures was not necessary as $S_2$ performed at criterion level during baseline trials.

$S_3$ - $S_3$ reached criterion performance after 3 teaching trials.

$S_4$ - $S_4$ reached criterion performance after 6 teaching trials.

$S_5$ - $S_5$ reached criterion performance after 2 teaching trials.

## Phase VI: Teaching students to arrange the delivery of 5 products or services to the school through use of the yellow pages and telephone.

Phase VI combined all of the skills required in Phases I - V. Initially, *Ss* were requested to use a telephone and a telephone book and arrange to have 5 products or services delivered to school.

Phase VI was considered completed when *Ss* could perform at criterion level using the skills learned in Phases I - IV on 4 of the 5 directions and could use their particular script to arrange the actual delivery of a product or service to the school on the 5th direction. The performance of *Ss* are not graphically depicted but can be summarized as follows:

*Baseline* (Prior to instruction on Phases I, II, III, IV, and V):

$S_1$ - $S_1$ arranged the delivery of 0 products or services to the school in the baseline trial.

$S_2$ - $S_2$ arranged the delivery of 0 products or services to the school in the baseline trial.

$S_3$ - $S_3$ arranged the delivery of 0 products or services to the school in the baseline trial.

$S_4$ - $S_4$ arranged the delivery of 0 products or services to the school in the baseline trial.

$S_5$ - $S_5$ arranged the delivery of 0 products or services to the school in the baseline trial.

*Testing*:

$S_1$ - $S_1$ made the responses necessary to arrange the delivery of 5 products or services in the testing trial.

$S_2$ - $S_2$ made the responses necessary to arrange the delivery of 5 products or services in the testing trial.

$S_3$ - $S_3$ made the responses necessary to arrange the delivery of 5 products or services in the testing trial.

$S_4$ - $S_4$ made the responses necessary to arrange the delivery of 5 products or services in the testing trial.

$S_5$ - $S_5$ made the responses necessary to arrange the delivery of 4 products or services in the testing trial.

Performance of Ss on Phase I

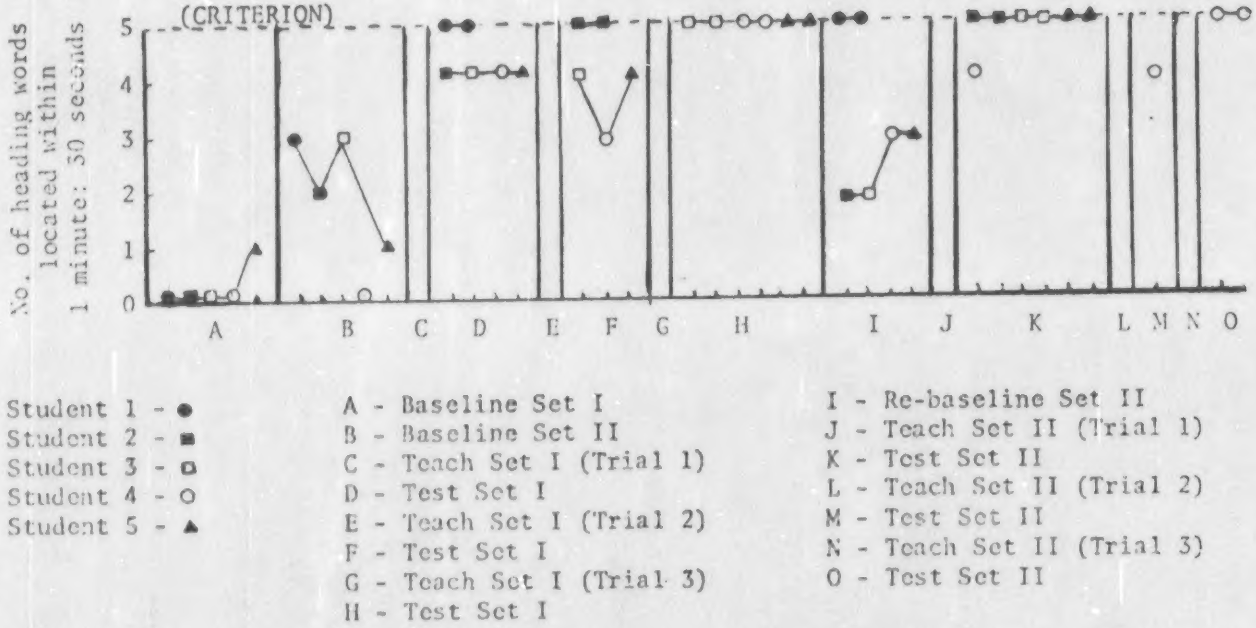

Figure A-1: This figure depicts the performance of Students 1-5 on the baseline and test trials for all steps of Phase I. Criterion performance for this phase involved correctly locating five heading and guide words from each of two sets within one minute: thirty seconds on two consecutive trials.

## DISCUSSION

The results as presented indicate that the major instructional objectives were realized. That is, the students acquired the skills necessary to locate ten heading words in the yellow pages with or without a visual cue; to name a heading word which corresponded to the function of ten community services; to discriminate whether a business has a delivery service; and to use the yellow pages to call a business on the telephone to secure this delivery service.

Although the skills taught do not remove all of the barriers limiting access to community services for physically handicapped individuals, they do provide a method for obtaining such services that was previously unavailable. These students now have a rudimentary understanding of how to use the yellow pages, thus increasing their ability to independently secure community services in comparison to physically handicapped persons without these skills.

There are a number of specific ways in which this program could be changed in order to facilitate more independent use of the yellow pages by physically handicapped students. For example, the alphabetical tab markers could be gradually faded while checking that the skills occurred without these cues. This would insure that the students did not become stimulus-bound to one particular phone book, increasing the generality of the location responses. Secondly, in Phase V, the scripts could be faded out and the students taught to rely solely on memory and the verbal cues supplied by the person called to make appropriate responses when speaking on the telephone. It should be noted that in this program the teacher often departed from the script (after criterion was reached) and asked students questions which did not appear on their copies. Also, the teaching procedure of Phase III could be changed from external teacher-cuing to internal self-cuing by the student, i.e., the student could name the first letter of the heading word (in Part 1) without the teacher cue "What is the first letter in this word?"

Strategies also could be implemented to facilitate the generalization of the yellow pages skills across persons, places, and businesses. First, the student could be taught to telephone from school to arrange for delivery service to his home, to telephone from home to arrange for delivery at school, and to telephone from home to arrange for delivery at home. These kinds of tasks would require the cooperation of the students' parents since monitoring of the responses made at home would be necessary to verify their execution. Another way to enhance generalization would be to structure situations within the classroom which initiate a need for a product and simultaneously stress the functional use of the skills taught. For example, have a class party requiring the students to arrange the delivery of the refreshments.

In addition to developing self-initiated use of the yellow pages and insuring for generalization, there are several logical extensions which could increase the level of self-sufficiency achieved through the program. For example, new heading words could be added to the list of ten increasing the number of products and services available to these students. This enlarged list could provide access to additional products (e.g., Restaurants, Orthopedic Appliances, etc.); repair services (e.g., Plumbing Contractors, Television & Radio Dealers - Retail, etc.); or emergency services (e.g., Electric Companies, Telephone Companies, etc.). The heading words chosen for this program represented specific categories of products or services whose delivery to the school was easily arranged. Other services such as repair or emergency service would be extensions of this program, but might require the service request to be made from the student's home. In addition, other supplemental skills could be developed which would bring products or services to the physically handicapped which cannot be acquired through the use of the yellow pages, such as teaching students to place mail orders, to order from catalogues, or to bank by mail. The telephone skills acquired by the students through this program could be adapted to fit the requirements of work situations which utilize the telephone, such as the responsibilities of a receptionist or switchboard operator.

Finally, the reader should be made aware of several cautions and limitations. First the students possessed the skills prerequisite to this program as outlined previously. Two students who did not possess the prerequisite skills were initially included in instruction. Later they were dropped because it was determined that they lacked necessary visual and perceptual abilities. Prerequisite skills 6, 7, and 21 appear to be the most crucial to success. Second, the program is very time-consuming; even considering the small number of trials to criterion these students exhibited, the program ran over four months. Third, the authors felt there were a number of factors influencing the low number of trials to criterion. The students seemed highly motivated to participate apparently because the program represented a departure from the traditional academic curriculum to which they were accustomed. It was assumed that this novelty was reinforcing and accounted for the high level of motivation. The students also seemed familiar with the delayed reinforcement involved with ordering and receiving a pizza, groceries, etc. They often worked throughout the program often reminding themselves of this reward. Other students in a similar program may initially require more immediate tangible reinforcement. In addition, there was a considerable amount of competition between the students. This resulted in each individual carefully attending to the other class members. Finally, concurrent with this program the students were involved in a money program in another classroom. As a result, they had no problem making the monetary transactions required in Phase VI. An extension of the two programs included a field trip to a shopping center where the students actually visited business establishments similar to those they later would be telephoning. Apparently prerequisites and powerful secondary reinforcers facilitated the realization of the program objectives.

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## APPENDIX A-1

### Phases I and III

### Sample Data Sheet

### Locating Heading Words

Heading Word: Cleaners Set: I Date:

| Student | Part 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $S_1$ | + | + | - | + | + | + | + | + | + | + |  |  |  | 9/10 |
| $S_2$ | + | + | - | - | + | - | + | + | + | + |  |  |  | 7/10 |
| $S_3$ | + | + | + | + | + | + | + | + | + | + |  |  |  | 10/10 |
| $S_4$ | + | + | + | + | + | + | + | + | + | + |  |  |  | 10/10 |
| $S_5$ | + | + | - | + | + | + | - | + | - | + |  |  |  | 7/10 |

Heading Word: Florists-Retail Set: I Date:

| Student | Part 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $S_1$ | + | - | + | + | + | - | + | + | + | - | + | + | + | 10/13 |
| $S_2$ | + | + | - | - | + | - | - | + | + | + | + | + | + | 9/13 |
| $S_3$ | + | + | + | + | + | + | + | + | + | - | + | + | + | 12/13 |
| $S_4$ | + | + | + | + | + | + | + | + | + | + | + | + | + | 13/13 |
| $S_5$ | + | - | + | + | + | - | + | + | - | + | + | + | + | 10/13 |

Heading Word: Set: I Date:

| Student | Part 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## APPENDIX A-2

## Phases I, II, III, IV, and VI

## Sample Data Sheet

Phase: Part:

Date:

Task:

Type of Reinforcement:

| Name | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

## APPENDIX A-3

## Phase VI

## Sample Data and Worksheet

Student: ____________________ Date ____________________

# Correct ____________________

1. Grocers - Retail Cleaners Cheese
2. Grocers - Retail Pizza Cosmetics & Perfumes - Retail
3. Cheese Grocers - Retail Dairies
4. Florists - Retail Hospital Equipment & Supplies Laundries
5. Cheese Dairies Pizza
6. Cheese Bakers - Retail Dairies
7. Bakers - Retail Cosmetics & Perfumes - Retail Florists - Retail
8. Grocers - Retail Pizza Bakers - Retail
9. Cleaners Laundries Hospital Equipment & Supplies
10. Hospital Equipment & Supplies Cleaners Cosmetics & Perfumes - Retail

## APPENDIX A-4

## Phase IV

## Sample Data Sheet

### Locating Business Names and Telephone Numbers

Heading Word: Cleaners Trial: 2 Date:

| Student | Part<br>2 | 3 | [illegible] | 5 | 6 | Total |
|---|---|---|---|---|---|---|
| $\underline{S}_1$ | + | + | - | + | + | 4/5 |
| $\underline{S}_2$ | + | + | - | - | + | 3/5 |
| $\underline{S}_3$ | + | + | + | + | + | 5/5 |
| $\underline{S}_4$ | + | + | + | + | + | 5/5 |
| $\underline{S}_5$ | - | + | + | - | + | 3/5 |

Heading Word: Trial: Date:

| Student | Part<br>2 | 3 | 4 | 5 | 6 | Total |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## APPENDIX A-5

## Phase V

## Sample Script

Heading Word: Cleaners

Business: Good afternoon. Madison Steam and Dye.

John: Hello. My name is Joyn Hayes. I would like to have some clothes to be dry cleaned picked up at my school.

Business: What is the name and address of the school?

John: Lapham School. 1045 East Dayton Street. Room 117.

Business: What is your name?

John: John Hayes. The cleaning will be billed to my teacher, Mrs. Kittelsen.

Business: When can we pick those up?

John: Today or tomorrow before three.

Business: We will take care of it. Thank you. Goodbye.

John: Thank you. Goodbye.

## APPENDIX A-6

### Phase V

### Sample Data Sheet

Telephone Dialogue Responses

name ________ business ________ trials ________ date ________

| Trial | 1 | 2 | 3 | 4 | 5 | | |
|---|---|---|---|---|---|---|---|
| 1. Greeting | + | + | + | + | + | | |
| 2. Address | - | - | + | + | + | | |
| 3. Name | + | + | + | + | + | | |
| 4. Product | - | + | + | + | + | | |
| 5. Time | + | - | - | + | + | | |
| 6. Closing | + | + | + | + | + | | |
| # correct | 4 | 4 | 5 | 6 | 6 | | |

name ________ business ________ trials ________ date ________

| Trial | 1 | 2 | 3 | 4 | 5 | | |
|---|---|---|---|---|---|---|---|
| 1. Greeting | | | | | | | |
| 2. Address | | | | | | | |
| 3. Name | | | | | | | |
| 4. Product | | | | | | | |
| 5. Time | | | | | | | |
| 6. Closing | | | | | | | |
| # correct | | | | | | | |

# A COMPARISON OF TWO PROCEDURES FOR TEACHING SEVERELY HANDICAPPED STUDENTS TO DIFFERENTIALLY RESPOND TO INDIVIDUAL COMPONENTS OF LANGUAGE CUES[1]

By

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Abstract: This study compared the relative efficiency of a successive-concurrent procedure and a concurrent procedure designed to teach severely handicapped students noun tasks (more-tasks), and to teach differential responding to four different verb components of verbal langaue cues (i.e., "Point to more," "Give me more," "Take more" and "Cover up more"). It also assessed the effect of instruction in a successive procedure on subsequent performance in a concurrent procedure. The results of this research indicated that: 1) the successive-concurrent procedure and the concurrent procedure were both effective in teaching students noun tasks and to differentially respond to individual components of verbal language cues: 2) the concurrent procedure might be more efficient than the successive-concurrent procedure; and 3) students taught in the successive-concurrent procedure did not learn to differentially respond to individual components of verbal language cues in the successive procedure but learned to differentially respond to the individual components in the concurrent procedure. The research results suggested that the mere exposure to language cues as they occur in many instructional situations does not necessarily insure that students are learning to differentially respond to the individual components of those cues. The implication is that instructional programs should include procedures similar to the concurrent procedure which insure that students are required to learn and to differentially respond to the individual components of verbal language cues.

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[2] Appreciation is expressed to Sue Hamre Nietupski who provided access to her students and taught them the experimental tasks. The cooperation and encouragement of Dr. Tim Crowner, Principal of Badger School, was extremely valuable. Appreciation is also extended to professors Lou Brown, Leonard Ross, David Yoder, Clark Wambold and LeRoy Aserlind for their constructive suggestions, encouragement and support of this research project. Finally appreciation is expressed to Judy Spain, an excellent typist and editorial commentator.

[3] The study presented is a condensation of a doctoral dissertation in Education - Department of Studies in Behavioral Disabilities, University of Wisconsin - Madison.

One problem that is typically encountered in the instruction of severely handicapped students is that they often do not appropriately perform skills acquired in one teaching environment in other settings in which those skills are functional (Sailor, Guess, and Baer, 1973). Failure of instructional programs to teach severely handicapped students to appropriately perform skills taught in an initial teaching environment across other environmental configurations has deleterious effects for at least two major reasons. First, this skill deficit may set the students apart from others and mark them as developmentally retarded, and secondly, such a failure to appropriately perform skills across environmental configurations necessitates duplication of time and effort in teaching the skills in other environments.

The failure of instructional programs to teach severely handicapped students to appropriately perform skills learned in an initial teaching environment in other settings may be the result of many factors. One such factor may be differences between the verbal language cues the students are taught to respond to in the initial teaching environment and the verbal language cues they are requested to respond to in other environments. Appropriately responding to different verbal language cues may be analyzed in terms of the students' abilities to differentially respond to individual components of the language cues.

Verbal language cues to respond usually include verb and noun components. The verb components indicate the action to be performed (e.g., "touch," "take," "give," "throw") and the noun components indicate the recipient of the action (e.g., "touch ball," "take paper"). A series of different verbal language cues to respond could require topographically similar responses (e.g., "Pick up many," "Pick up several," "Pick up a lot," or "Pick up a bunch"). In this case the listener is not required to differentially respond to all the salient components of the cues (e.g., nouns, verbs) to correctly perform the task. However, most common human situations require individuals to respond differentially to the individual components of verbal language cues. That is, language cues such as "give me cup," "take cup," "point to truck," "cover up truck" are typically presented consecutively in a varied order. To correctly respond to the cues the listener must differentially respond to the individual verb and noun components of the cues. The implication for instructional programming is that in order to insure that students can perform skills across environmental configurations the students must be taught to differentially respond to the common variations in individual components of language cues that frequently occur.

A literature review revealed a paucity of studies which compared the relative efficiency of procedures designed to teach students to differentially respond to individual components of verbal language cues. This study compared the relative efficiency of two procedures designed: a) to teach severely handicapped students noun tasks (more-tasks); and b) to teach differential responding to four different verb components of verbal language cues (i.e., "Point to more," "Give me more," "Take more," "Cover up more"). The two instructional procedures compared were variations of successive and concurrent procedures that have been used to teach visual discrimination skills in a variety of experimental laboratory settings (Darby and Riopelle, 1955; Leary, 1958; and Hayes, Thompson and Hayes, 1953).

In a concurrent procedure all the different language cues are presented and if necessary taught together in an arrangement which varies the order of the cues. In a successive procedure one cue is repeatedly presented and if necessary taught (e.g., "Take more," "Take more," "Take more"). When students perform at criterion, another cue is repeatedly presented, etc. until the different cues (e.g., "Take more," "Cover up more," "Point to more," "Give me more") have been taught separately.

Leary (1958) suggests that there are at least three not necessarily mutually exclusive research and, potentially, instructional advantages of the concurrent procedure: a) many procedural variations common in human learning research can be attempted; b) the number of problems (cues) taught concurrently is a variable that is easily controlled; and c) the serial-discrimination (concurrent) technique appears more like the ordinary daily human situation in which discriminations are made one after the other. However, Leary also suggests that learning as a function of the concurrent procedure may be relatively difficult because of the delay between presentations of a given problem as well as the possible interfering effects of related problems. On the other hand, several laboratory studies suggest that a successive procedure may be more efficient than a concurrent procedure in that when specified comparisons were made, subjects learned individual problems in fewer trials when a successive procedure was used (Wishner and O'Connell, 1962; Darby and Riopelle, 1955).

In the present study a concurrent procedure was used to teach the concurrent group the more-tasks and to differentially respond to the verbal language cues. A successive-concurrent procedure was used to teach the successive-concurrent group the more-tasks and to differentially respond to the verbal language cues. In the concurrent procedure all the cues were taught together from the beginning. In the successive-concurrent procedure each of the cues was first taught separately (successively) and then in combination with the other cues (concurrently). The relative efficiency of the two procedures was determined by comparing the total number of error responses successive-concurrent group and concurrent group students made when they were being taught more-tasks and the four different verbal language cues.

In addition, a concurrent procedure teaches differential responding to individual components of language cues and a successive procedure may not. A literature review indicated that there was a paucity of studies which at the completion of teaching several problems in the successive procedure tested to determine if subjects could differentially respond to the problems presented in the arrangement required by the concurrent procedure. In this study the effect of learning in the successive procedure on subsequent performance in the concurrent procedure was investigated. That is, an assessment was made of the number of errors successive-concurrent group students made when, after learning the more-tasks and the language cues in the successive procedure, they were presented the more-tasks and the language cues in the concurrent procedure.

Prior to initiating instruction in either the concurrent procedure or the successive-concurrent procedure all students were pretested (baselined) on their performance of the more-tasks and their ability to differentially respond to the verbal language cues presented in the arrangement of the concurrent procedure. This data was used to match pairs of students. A member of each pair was randomly assigned to the concurrent group and the other member was assigned to the successive-concurrent group.

## METHODOLOGY

### Students (Ss)

A class of 10 severely handicapped Ss in a Madison public school participated in the study. Ss did not manifest gross neurological, sensory or motor impairments; were labeled moderately retarded (Grossman, 1973); could imitate motoric and verbal models; and had learned rudimentary math, reading, language and self-help skills. These Ss were selected because the tasks of concern were relevant to their educational development and because they presented a range of functioning levels.

TABLE I

CA and IQ Scores of 10 Ss

| | CA | IQ Scores |
|---|---|---|
| $S_1$ | 14-10 | 49 |
| $S_2$ | 14-9 | 51 |
| $S_3$ | 17-6 | 46 |
| $S_4$ | 15-2 | 40 |
| $S_5$ | 14-4 | 41 |
| $S_6$ | 14-2 | 42 |
| $S_7$ | 14-9 | 48 |
| $S_8$ | 12-10 | 42 |
| $S_9$ | 15-1 | 45 |
| $S_{10}$ | 17-2 | 39 |
| Mean | 14-9 | 44.3 |

## Experimental Design: Testing and Instructional Sequence and Procedures

### Testing and Instructional Sequence

Phase I: Baseline - Ss were baselined on their ability to perform the more-tasks and to differentially respond to the four different verbal language cues when they were presented in the serial discrimination arrangement of the concurrent procedure. On the basis of S's baseline performances matched pairs were formed. One member of each matched pair was randomly assigned to a successive-concurrent group and the other to a concurrent group.

Phase II: A successive procedure was used to teach the successive-concurrent group the tasks of concern. When an S in the successive-concurrent group met criterion on the tasks of concern that S was advanced to Phase III. Ss in successive-concurrent group were given a maximum of 240 trials across Phases II and III. A concurrent procedure was used to teach the concurrent group the tasks of concern. When an S in the concurrent group met criterion on the tasks of concern, that S's participation in the study was terminated. Ss in the concurrent group were given a maximum of 240 trials.

Phase III: If an S in the successive-concurrent group performed at criterion in Phase II, that S was presented, and if necessary, taught the tasks of concern using the concurrent procedure. When an S in the successive-concurrent group met criterion on the tasks of concern, that S's participation in the study was terminated.

### Operational Definitions of Response Indicators

Operational definitions of Ss' responses to the four different verbal language cues were as follows:

A. "Point to": With index finger extended and other digits folded in a fist position on one hand, S was required to touch or point to (not more than 6" directly above) a set of objects.

B. "Give me": S was required to pick up one of the sets of objects and place it in the teacher's (T) hand.

C. "Take": S was required to pick up a set of objects and move it toward him/herself (at least 3").

D. "Cover up": With all digits extended S was required to rest his/her hand on a set of objects.

## Definitions of Correct and Error Responses

Definitions of correct and error responses were as follows:

A. Correct response: If S used the correct response indicator and chose the correct set, his/her response was scored as correct.

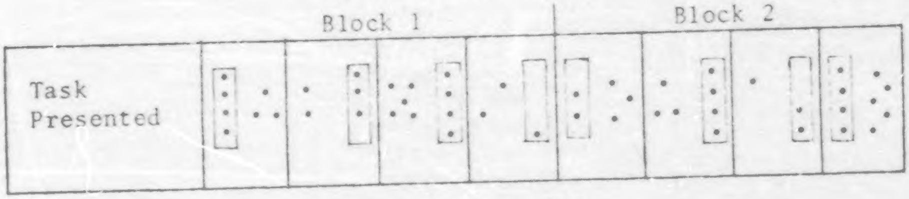
B. Error response: If S chose the wrong set and/or used the wrong response indicator, his/her response was scored as an error. For purposes of data analysis error responses were categorized as:
   1. Errors: S chose the wrong set and/or used the wrong response indicator.
   2. Choice errors: S chose the wrong set.
   3. Indicator errors: S used the wrong response indicator.
   4. Sum of choice plus indicator errors: S's choice and indicator errors were totaled.

## More-Tasks

The more-tasks were chosen because skills related to relative quantities were components of Ss' current math curriculum. The more-tasks may be described as follows (See Figure 1): An S was presented with 2 sets of pennies of unequal quantity and asked to indicate which set had "more" pennies. In one set pennies were pasted 1/2" apart in a vertical array on a 1" x 5" white card (object cards). The members of the other set were presented on a cream colored table in a varied array not more than 4" from the object card.

FIGURE 1

A Partial Task Presentation Sequence



A set of objects on an object card in a vertical array and a set of objects on the table in a varied array constituted a set combination. The following eight set combinations were used: one penny on an object card and two pennies on the table; one penny on the table and two pennies on an object card; two pennies on an object card and three pennies on the table; two pennies on the table and three pennies on an object card; three pennies on an object card and four pennies on the table; three pennies on the table and four pennies on an object card; four pennies on an object card and five pennies on the table; or four pennies on the table and five pennies on an object card.

The individual presentation of four set combinations was considered a block of sets. Each block of four set combinations consisted of a set of: one penny and two pennies; two pennies and three pennies; three pennies and four pennies; and four pennies and five pennies. Presentation of each different set combination constituted a trial. Therefore, there were four trials per block of sets. To control for responding to the order in which set combinations were presented, or the left-right spatial position of the set with more, or the set presented in a varied array, the set combinations were presented as follows:

1. The left-right spatial position of the set with more in relation to the set with less was determined by a Fellow's Sequence (Fellow, 1967, See Appendix A).
2. The presentation order of set combinations (e.g., 2-1, 3-2, 4-5, 3-4) within blocks was varied on consecutive blocks such that one set combination did not follow another in two consecutive blocks (See Appendix B).
3. Within each set combination the set presented on the table and the set presented on an object card was determined by a Fellow's Sequence (See Appendix C).

A partial task presentation sequence is depicted in Figure 1.

## Instructional Procedure

Prior to implementing instruction the T was directed to present verbal language cues in a natural and consistent manner in which her tone or pacing of the cues would not emphasize the individual components of the language cues.

1. When a group of 5 Ss were seated at a rectangular table (3' x 5') facing T, T initiated a trial by saying, "Look at the sets," while she moved her index finger across the sets and then said, "Point to more" (or whatever language cue was appropriate).
2. T determined if S's response was correct.
   a. Correct response: If S pointed to the set with more, his/her response was scored as correct, S was praised (e.g., Good! Right!) and the trial was terminated
   b. Incorrect response: If S pointed to the wrong set and/or used the wrong response indicator (e.g., covered up instead of pointed to) T scored the type of response error (i.e., choice error and/or indicator error) and proceeded to Step 3 (See sample data sheet, Appendix F).

3. T implemented the correction procedure (instructional procedure). She said, "No, do this," lined the members of the sets up manifesting one-to-one correspondence (e.g., $\boxed{\vdots}$ : ), modeled the "more determination procedure,"[4] pointed to the set with more, and said "more." Next, T varied the array of the members of the set on the table and repeated the language cue, "Point to more."

4. T determined if S's response was correct.
   a. Correct response: If S arranged the sets to manifest one-to-one correspondence, performed the "more determination procedure" and pointed to only the set with more members, T recorded a response error, but that S performed correctly after T modeled the correct response.
   b. Error response: If S pointed to the wrong set and/or used the wrong response indicator, T recorded a response error, coded the type of error (choice error and/or indicator error), and terminated the trial.

The set combinations were presented in round robin fashion. That is, each S was presented one set combination before any S was presented with a second set combination and each S was presented a second set combination before any S was presented a third set combination, etc. Each S was presented with 12 set combinations during each instructional session.

Baseline Procedure

The baseline entailed consecutively presenting the more-tasks and the four verbal language cues in the concurrent procedure. As depicted in Figure 2, the individual presentation of the four different verbal language cues (i.e., "Point to more," "Give me more," "Take more," "Cover up more") constituted a block of language cues. The blocks of four different verbal language cues coincided with the blocks of four set combinations (i.e., 1-2, 2-3, 3-4 and 4-5). The presentation order of the four different verbal language cues within blocks was varied on consecutive blocks such that one language cue did not follow another in two consecutive blocks (See Appendix D).

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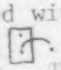
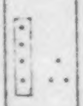
[4] More determination procedure: When presented two sets of objects, the teacher/student concurrently pointed with their right and left hands to parallel members of each set (  ) only once until they had pointed to each member of both sets. Then, while holding a finger on a member of the set with less members, they pointed to one additional member of the set with more.

FIGURE 2

The Presentation Sequence for the Baselines

| | Trials | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Block 1 | | | | Block 2 | | | | Block 3 | | | |
| Language Cue | Point To | Give Me | Take | Cover Up | Give Me | Cover Up | Take | Point To | Take | Give Me | Point To | Cover Up |
| Task Presented |  | | | | | | | | | | | |

Steps 1 and 2 of the instructional procedure were implemented without feedback regarding the correctness or incorrectness of response. The set combinations were presented in round robin fashion with each S having the opportunity to respond to 12 set combinations (8 of which were different).

## Procedure Used to Arrange Matched Pairs

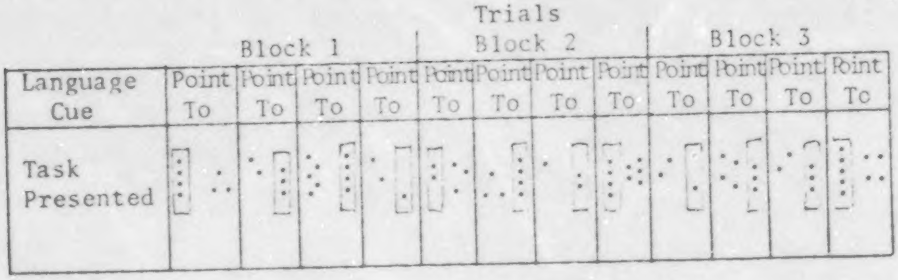
When 10 Ss made 6 or more error responses in the baseline trials, 5 matched pairs were formed. Ss were matched on the basis of the number of error responses, choice errors, indicator errors and sum of choice plus indicator errors in the following manner. The total number of errors, choice errors, indicator errors and the sum of choice plus indicator errors of each S were ranked from lowest to highest. Ss with the closest rankings were paired. One member of each matched pair was randomly assigned to the successive-concurrent group and the other to the concurrent group.

## Successive Procedure

The successive procedure required that the more-tasks and a particular verbal language cue be repeatedly presented (e.g., take more, take more, take more) and if necessary taught until an S demonstrated criterion performed on the more-tasks and that particular language cue (See Figure 3). Criterion was set at 83% correct responding across two consecutive blocks (5 out of 6 trials) within a single instructional session. Then a language cue with a different verb component and the more-tasks were repeatedly presented and if necessary taught until an S demonstrated criterion performance on the more-tasks and the different language cue. The same procedure was followed using the two additional language cues with different verb components. The language cues which were presented first, second, third and fourth were selected on the basis of the percent of response indicator errors all Ss made to each language cue in baseline trials. The language cue with the lowest percent of response indicator errors was taught first, the language cue with the second lowest percent of response indicator errors was taught second, etc. The same presentation and instructional procedures described in the more-tasks section was used to teach responding to the four language cues.

FIGURE 3

A Partial Presentation Sequence for the Successive Procedure



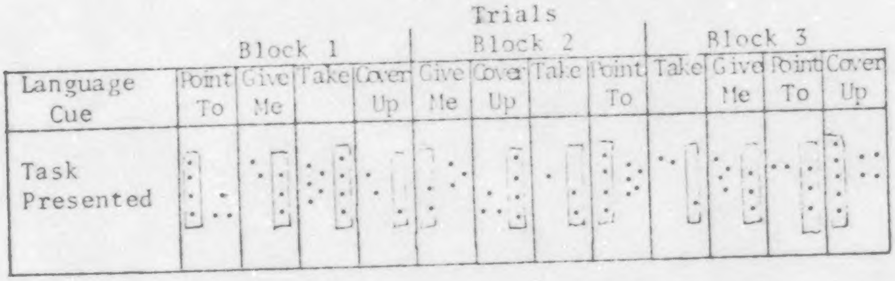
| | Trials | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Block 1 | | | | Block 2 | | | | Block 3 | | | |
| Language Cue | Point To | Point To | Point To | Point To | Point To | Point To | Point To | Point To | Point To | Point To | Point To | Point To |
| Task Presented | | | | | | | | | | | | |

## Concurrent Procedure

The concurrent procedure entailed consecutively presenting the more-tasks and the four verbal language cues in a serial arrangement which systematically varied the order of the cues: (e.g., "Point to more," "Give me more," "Take more," "Cover up more"). As depicted in Figure 4, the individual presentation of the four different verbal language cues coincided with the blocks of four set combinations (i.e., 2-1, 3-2, 4-3, 5-4). The presentation order of the four different verbal language cues within blocks was varied on consecutive blocks such that one language cue did not follow another in two consecutive blocks (See Appendix D).

FIGURE 4

A Partial Presentation Sequence for the Concurrent Procedure



| | Trials | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Block 1 | | | | Block 2 | | | | Block 3 | | | |
| Language Cue | Point To | Give Me | Take | Cover Up | Give Me | Cover Up | Take | Point To | Take | Give Me | Point To | Cover Up |
| Task Presented | | | | | | | | | | | | |

The procedures for presenting and teaching the more-tasks in the concurrent procedure was the same as the procedure described in the More-Tasks section.

## Interjudge Agreement

Interjudge agreement data was collected during one session of Phase I, during one session of Phase II (successive-concurrent procedure), during one session of Phase II (concurrent procedure) and during one session of Phase III. Interjudge agreement was obtained from a trial-by-trial comparison of T's and the second observer's scoring of choice and response indicator errors. Interjudge agreement was computed by dividing the total number of agreements by the sum of the total number of agreements plus the total number of disagreements.

## RESULTS

### Baseline Performance and Selection of Matched Pairs

In the baseline trials, as depicted in Table 2, each of 10 Ss made 6 or more errors. This made all 10 Ss eligible. The total errors, choice errors, indicator errors and the sum of choice plus indicator errors each S made were ranked from lowest to highest and Ss with the closest rankings on all these parameters were paired. As depicted in Table 2 this procedure resulted in the concurrent group and the successive-concurrent group having the following means respectively: total errors 8.6 and 8.6, choice errors 6.4 and 6.4, indicator errors 5.6 and 4.8, and sum of choice plus indicator errors 11.6 and 11.2.

TABLE 2

Total Errors, Choice Errors, Indicator Errors, and Sum of Choice Plus Indicator Errors Each Group Made During Baseline Trials

| | Concurrent Group | | | | | Successive-Concurrent Group | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total Errors | Choice Errors | Indic. Errors | Ch. + In. Errors | | Total Errors | Choice Errors | Indic. Errors | Ch. + In. Errors |
| $S_1$ | 7 | 5 | 4 | 9 | $S_2$ | 6 | 6 | 0 | 6 |
| $S_3$ | 7 | 6 | 3 | 9 | $S_4$ | 8 | 6 | 3 | 9 |
| $S_5$ | 8 | 5 | 7 | 12 | $S_6$ | 11 | 6 | 6 | 12 |
| $S_7$ | 10 | 8 | 4 | 12 | $S_8$ | 8 | 8 | 6 | 14 |
| $S_9$ | 11 | 8 | 8 | 16 | $S_{10}$ | 10 | 6 | 9 | 15 |
| Total | 43 | 32 | 26 | 58 | | 43 | 32 | 24 | 56 |
| Mean | 8.6 | 6.4 | 5.2 | 11.6 | | 8.6 | 6.4 | 4.8 | 11.2 |

## Percent of Response Indicator Errors in Baseline Trials

In the successive procedure the response indicator with the lowest percent of response indicator errors was taught first, the response indicator with the second lowest percent of response indicator errors was taught second, etc. The response indicator with the lowest percent of response indicator errors was "cover up" (32%), the second lowest was "point to (42%), the third lowest was "give me" (52%), and the fourth lowest was "take" (82%).

## Interjudge Agreement

Interjudge agreement data collected during one session of Phase I, one session of Phase II (successive-concurrent procedure), one session of Phase II (concurrent procedure), and one session of Phase III. Interjudge agreement was computed by dividing the total number of agreements by the sum of the total number of agreements plus total number of disagreement of T's and a second observer's scoring of choice and response indicator errors. There was perfect interjudge agreement.

## General Experimental Results

The concurrent group learned the more-tasks and to differentially respond to the individual components of the different verbal language cues when they were presented in the concurrent procedure (Table 2). Data presented in Table 3 indicates that, except for $S_6$,[5] the successive-concurrent group Ss learned the more-tasks and to respond to the four different verbal language cues presented in the successive procedure.

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[5] When $S_6$ had been presented the maximum number of training trials (240), she was still learning the first response indicator (cover up) of the successive procedure and had not learned to differentially respond to the set with more pennies. She was utilizing an inappropriate choice selection strategy (denoting the set presented in the varied array as more) which produced a 50% level of correct choice responding. The instructional procedure utilized in this study apparently was not appropriate for $S_6$.

## TABLE 2

Total Errors, Choice Errors, Indicator Errors, Sum of Choice Plus Indicator Errors and Trials to Criterion of Concurrent Group Ss

| | Total Errors | Choice Errors | Indic. Errors | Ch. + In. Errors | Trials To Crit. |
|---|---|---|---|---|---|
| $\underline{S}_1$ | 5 | 1 | 4 | 5 | 24+ |
| $\underline{S}_3$ | 71 | 56 | 26 | 82 | 168+ |
| $\underline{S}_5$ | 105 | 59 | 75 | 134 | 192+ |
| $\underline{S}_7$ | 20 | 10 | 13 | 23 | 48+ |
| $\underline{S}_9$ | 20 | 11 | 16 | 27 | 48+ |
| Total | 221 | 137 | 134 | 271 | 480 |
| Mean | 44.2 | 27.4 | 26.8 | 54.2 | 96.0 |

+S learned the more-tasks and to differentially respond to the language cues presented in the concurrent procedure.

## TABLE 3

Total Errors, Choice Errors, Indicator Errors, Sum of Choice Plus Indicator Errors and Trials to Criterion of Successive-Concurrent Group *S*s When Presented the More-Tasks and Language Cues in the Successive Procedure

| | Total Errors | Choice Errors | Indic. Errors | Ch. + In. Errors | Trials To Crit. |
|---|---|---|---|---|---|
| $S_2$ | 6 | 4 | 2 | 6 | 30+ |
| $S_4$ | 20 | 18 | 2 | 20 | 72+ |
| $S_6$ | 162 | 153 | 14 | 167 | 240* |
| $S_8$ | 16 | 6 | 10 | 16 | 48+ |
| $S_{10}$ | 30 | 22 | 8 | 30 | 84+ |
| Total | 234 | 203 | 36 | 239 | 474 |
| Mean | 46.8 | 40.6 | 7.2 | 47.8 | 94.8 |

*$S_6$ was presented the maximum number of trials without reaching criterion.

+*S* learned the more-tasks and to respond to the verbal language cues presented in the successive procedure.

*S*s in the successive-concurrent group who learned the more-tasks and the four verbal language cues in the successive procedure were presented and if necessary taught the more-tasks and the four verbal language cues presented in the concurrent procedure. The performance data of the successive-concurrent group in the concurrent procedure ($S_6$ excluded) is presented in Table 4. Except for $S_2$ who did not make response indicator errors when presented the four verbal language cues in the serial arrangement of the concurrent procedure during baseline trials, all *S*s in the successive-concurrent group made response indicator errors when presented the four verbal language cues in the serial arrangement of concurrent procedure. This data is interpreted to suggest that in the successive procedure the successive-concurrent group *S*s did not learn to differentially respond to individual components of the language cues as required by the concurrent procedure. However, the successive-concurrent group *S*s did learn to differentially respond to the individual components of language cues when they were presented and taught in the arrangement required by the concurrent procedure.

TABLE 4

Total Errors, Choice Errors, Indicator Errors, Sum of Choice Plus Indicator Errors and Trials to Criterion of Successive-Concurrent Group Ss When Presented the More-Tasks and Language Cues in the Concurrent Procedure

| | Total Errors | Choice Errors | Indic. Errors | Ch. + In. Errors | Trials To Crit. |
|---|---|---|---|---|---|
| $S_2$ | 0 | 0 | 0 | 0 | 12+ |
| $S_4$ | 15 | 3 | 15 | 18 | 48+ |
| $S_6$ | - | - | - | - | -* |
| $S_8$ | 9 | 2 | 7 | 9 | 36+ |
| $S_{10}$ | 68 | 4 | 66 | 70 | 156+ |
| Total | 92 | 9 | 88 | 97 | 252 |
| Mean | 23 | 2.25 | 22 | 24.25 | 63 |

*$S_6$ did not meet criterion on the tasks presented in the successive procedure and thus was never advanced to being presented the tasks in the concurrent procedure.

+S learned the more-tasks and to differentially respond to the language cues presented in the concurrent procedure.

## Statistical Comparisons of the Concurrent Group and the Successive-Concurrent Group Performance

The relative efficiency of the concurrent procedure and the successive-concurrent procedure was assessed by statistically testing for a significant difference between the total number of error responses made by the concurrent group and the total number of error responses made by the successive-concurrent group. In addition, statistical comparisons were also made between the total number of choice errors, indicator errors, sum of choice plus indicator errors and trials to criterion.

Table 5 depicts the total errors, choice errors, indicator errors, sum of choice plus indicator errors and trials to criterion for each S in the concurrent group and each S in the successive-concurrent group.

TABLE 5

Total Number of Errors, Choice Errors, Indicator Errors and Sum of Choice Plus Indicator Errors Made by Concurrent Group and Successive-Concurrent Group Ss

| | Concurrent Group | | | | | | Successive-Concurrent Group | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Errors | Choice Errors | Indic. Errors | Ch. + In. Errors | Trials To Crit. | | Total Errors | Choice Errors | Indic. Errors | Ch. + In. Errors | Trials To Crit. |
| $S_1$ | 5 | 1 | 4 | 5 | 24 | $S_2$ | 6 | 4 | 2 | 6 | 42 |
| $S_3$ | 71 | 56 | 26 | 82 | 168 | $S_4$ | 35 | 21 | 17 | 38 | 120 |
| $S_5$ | 105 | 59 | 75 | 134 | 192 | $S_6$ | 162 | 153 | 14 | 167 | 240* |
| $S_7$ | 20 | 10 | 13 | 23 | 48 | $S_8$ | 24 | 8 | 17 | 25 | 84 |
| $S_9$ | 20 | 11 | 16 | 27 | 48 | $S_{10}$ | 98 | 26 | 74 | 100 | 240 |
| Total | 221 | 137 | 134 | 271 | 480 | | 326 | 212 | 124 | 336 | 726 |
| Group Mean | 44.2 | 27.4 | 26.8 | 54.2 | 96 | | 65.2 | 42.4 | 24.8 | 67.2 | 145.2 |

*$S_6$ did not learn the tasks presented in the successive procedure and thus was never presented the tasks in the concurrent procedure.

The "Randomization Test for Matched Pairs" (Siegel, 1956) and the Dependent T Test were performed. Results of the Randomization Test for matched pairs and the Dependent T Tests on comparisons of the concurrent group's and successive-concurrent group's total errors, choice errors, indicator errors, sum of choice plus indicator errors and trials to criterion indicated that there were no significant differences between the concurrent and successive-concurrent procedures.

Although there were not statistically significant differences it was noteworthy that in the matched S comparisons (Table 5) that:

a. four out of five Ss in the concurrent group made fewer errors then their match;[6]

b. four out of five Ss in the concurrent group made fewer sum of choice plus indicator errors then their match;

c. four out of five Ss in the concurrent group reached criterion in fewer trials then their match;

d. one match, $S_3$ and $S_4$, was consistently in disagreement with the other four on comparisons a, b, and c above;

e. the mean of the concurrent group was less then the successive-concurrent group for comparisons a, b, and c above (Table 5).

The results (a-e above) indicated that although there were not a statistically significant difference on any comparison, there were noteworthy differences which suggested that the concurrent procedure was more efficient than the successive-concurrent procedure.

## Summary of Results

Based upon the analyses presented above, the following statements seem tenable:

1. Five out of five concurrent group Ss learned the more-tasks and to differentially respond to the four language cues taught in the concurrent procedure. Four out of five successive-concurrent group Ss learned the more-tasks and to differentially respond to the language cues. Thus, the effectiveness of both procedures was demonstrated.

2. The performance of Ss did not support the contention that either the concurrent procedure or successive-concurrent procedure was significantly more efficient then the other when performance parameters of total errors, choice errors, indicator errors, sum of choice plus indicator errors and trials to criterion were compared. However, there were noteworthy performance differences which were interpreted as indicating that the concurrent procedure might be more efficient when those parameters are considered.

3. Successive-concurrent group Ss did not learn to differentially respond to the individual components of the language cues as those cues were presented in the successive procedure. However, successive-concurrent

group Ss did learn to respond differentially to individual components of the language cues when those cues were presented in the concurrent procedure. Thus, it would appear that if Ss are to learn to differentially respond to language cues those cues should be taught in a concurrent procedure.

## DISCUSSION

The most salient hazard regarding the interpretation of the results is the absence of statistically significant differences between procedures. Although student performance did not demonstrate that either the concurrent procedure or the successive-concurrent procedure was significantly more efficient then the other, it did demonstrate the effectiveness of both procedures in teaching the students the tasks of concern. That is, all students taught in the concurrent procedure learned the tasks of concern and four out of five students taught in the successive-concurrent procedure learned the tasks. It is unusual for procedures to be effective across a number of severely handicapped students without substantial modifications to make the procedure applicable to individual student performance characteristics.

It is of interest that, although there were no statistically significant differences between the concurrent and the successive-concurrent procedure when compared on performance parameters of total errors, choice errors, indicator errors, sum of choice plus indicator errors, and trials to criterion, there were noteworthy performance differences on these parameters. These differences were interpreted as suggesting that the concurrent procedure might be more efficient then the successive-concurrent procedure.

The results of the present study also indicated that students taught in the successive-concurrent procedure did not learn to differentially respond to individual components of the verbal language cues until the verbal language cues were presented and taught in the concurrent procedure. This result suggests that the mere exposure to language cues as they occur in many instructional situations does not necessarily insure that students are learning to differentially respond to individual components of those cues.

It must be noted that student performance may have been related to many factors. When the error response patterns of the students in this study were examined, some interesting differences were suggested. In baseline trials most students selected the set presented in a varied array as the set with more instead of using one-to-one correspondence operations or counting rationally to determine which set had more members. During intervention several students persisted in basing choice responses on the set presented in a varied array and indicator responses upon teacher gestures and timing of reinforcement.[6] These response patterns are of interest because they suggest that students learn and employ strategies which in some situations may be adequate substitutes for basing responses on relevant task dimensions and relevant components of verbal language cues. Obviously, such strategies will not be effective across all environments (e.g., not all teachers will provide the same gestural cues) which may explain why some severely handicapped students can perform a skill in one environmental configuration but not in other environmental configurations. In addition, such error response patterns indicate that some students may learn new skills more slowly then others because they are more persistent in using response strategies which are not based upon relevant task dimensions.

## Implications for Practice

This study emerged from questions as to what procedures are efficient for teaching students to perform functional skills across environmental configurations. The success of an instructional program should be assessed on the criteria that it should teach students to perform functional skills across tasks, materials, verbal language cues, people and settings that the students will frequently encounter. For example, the instructional objective for a "many" skill program might be: Given the language cues "Give each _____ many _____," "Take many _____," or "Put many _____ in the _____" by at least three control figures (e.g., teacher, mother, peer) in at least three settings (e.g., classroom, playground, home) and across at least three functional tasks (e.g., setting the table, passing out cookies, dealing cards) students should perform the skill.

Potentially, there are many instructional procedures which could be employed to insure that students mastered the objective. Some selected procedures are:

1. Instruct the students on one functional task given one verbal language cue, in one setting, with one teacher. Then test and, if necessary, teach the student to perform the skill given a second language cue to respond, functional task, teacher and setting, etc.

2. Instruct the students on one task, given one verbal language cue, in one setting, with one teacher and take advantage of every opportunity to require the students to use the skill across functional tasks, settings, people, and verbal language cues to respond. Then test

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[6] As described in the procedure section, the varied set choice strategy was controlled such that it would only produce a 50% level of correct responding. All teacher cues, other than the statement of the verbal language cue, were eliminated such that to meet criterion S had to base responding upon the verb and noun component of the language cues.

and, if necessary, teach the student to perform the skill given a second functional task, teacher, setting and verbal language cue to respond, etc.

3. Teach the students to use the skill across several functional tasks, settings, people, and verbal language cues to respond concurrently.

The third procedure teaches directly to the instructional objective. However, one could conjecture that teaching a student to perform a skill across several language cues, people, settings and task materials concurrently might impede the student's acquisition of a skill. As the result of such a conjecture, variations of procedures one and two which teach the student to perform a skill across each combination of tasks, people, settings and language cues successively are usually employed in curricula for the severely handicapped. Such procedures do not systematically incorporate teaching skill performance across several language cues, settings, people and functional tasks concurrently.

The students' performance in the present study indicated that teaching students to perform a skill across several language cues concurrently even without previous successive procedure instruction should not be detrimental to skill acquisition. Furthermore, an essential component of performance across most verbal language cues is differentially responding to individual components of the language cues. This study indicated that unless performance of a skill across different language cues is taught concurrently the students may not learn to differentially respond to individual language cue components. The implication is that if an objective of an instructional program is to teach students to perform skills across verbal language cues, then it is essential to teach the skill across different language cues concurrently. In addition, there is no apparent advantage to teaching the language cues successively prior to teaching them concurrently. Further research is needed to assess how many language cues, task materials, settings and people students can be taught to perform a skill across concurrently without significantly impeding skill acquisition. The efficiency of a concurrent procedure may depend on: 1) the functioning level of the students; 2) the students' previous experience responding to a concurrent procedure arrangement; 3) the meaning and discriminability of tasks to be learned concurrently; and 4) the number of tasks taught concurrently.

## APPENDIX A

### Fellow's Sequence

### Position

Instructional Session

1) 1 2 1 1 2 2 2 1 1 1 2 2

2) 1 1 2 2 2 1 1 1 2 2 1 2

3) 2 1 2 2 1 1 1 2 2 2 1 1

4) 2 2 1 1 1 2 2 2 1 1 2 1

5) 1 2 2 1 1 1 2 2 2 1 1 2

6) 2 1 1 2 2 2 1 1 1 2 2 1

1 = left

2 = right

# APPENDIX B

## Set Combinations Sequence

| | | | | | |
|---|---|---|---|---|---|
| Block | 1) | 3 | 2 | 4 | 1 |
| | 2) | 2 | 3 | 1 | 4 |
| | 3) | 1 | 3 | 2 | 4 |
| | 4) | 4 | 2 | 1 | 3 |
| | 5) | 4 | 3 | 2 | 1 |
| | 6) | 2 | 3 | 1 | 4 |
| | 7) | 1 | 2 | 3 | 4 |
| | 8) | 3 | 4 | 2 | 1 |
| | 9) | 1 | 2 | 3 | 4 |
| | 10) | 2 | 4 | 3 | 1 |
| | 11) | 3 | 2 | 1 | 4 |
| | 12) | 4 | 2 | 1 | 3 |
| | 13) | 2 | 4 | 3 | 1 |
| | 14) | 4 | 1 | 2 | 3 |
| | 15) | 3 | 4 | 2 | 1 |
| | 16) | 1 | 3 | 2 | 4 |
| | 17) | 3 | 4 | 2 | 1 |
| | 18) | 2 | 3 | 1 | 4 |

1 = 2-1
2 = 3-2
3 = 4-3
4 = 5-4

Start Over

# APPENDIX C

## Fellow's Sequence

## Arrays

### Instructional Session

1) 1 1 2 2 2 1 1 1 2 2 1 2

2) 2 1 2 2 1 1 1 2 2 2 1 1

3) 2 2 1 1 1 2 2 2 1 1 2 1

4) 1 2 2 1 1 1 2 2 2 1 1 2

5) 2 1 1 2 2 2 1 1 1 2 2 1

6) 1 2 1 1 2 2 2 1 1 1 2 2

1 = vertical array

2 = varied array

# APPENDIX D

## Verb Sequence

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| Block: | 1) | 1 | 2 | 3 | 4 |
|  | 2) | 2 | 4 | 3 | 1 |
|  | 3) | 3 | 2 | 1 | 4 |
|  | 4) | 4 | 2 | 1 | 3 |
|  | 5) | 2 | 4 | 3 | 1 |
|  | 6) | 4 | 1 | 2 | 3 |
|  | 7) | 3 | 4 | 2 | 1 |
|  | 8) | 1 | 3 | 2 | 4 |
|  | 9) | 3 | 4 | 2 | 1 |
|  | 10) | 2 | 3 | 1 | 4 |
|  | 11) | 1 | 3 | 2 | 4 |
|  | 12) | 4 | 2 | 1 | 3 |
|  | 13) | 4 | 3 | 2 | 1 |
|  | 14) | 2 | 3 | 1 | 4 |
|  | 15) | 1 | 3 | 2 | 4 |
|  | 16) | 3 | 4 | 2 | 1 |

Start Over

1 = point to
2 = give me
3 = take
4 = cover up

## APPENDIX E

## Sample Data Sheet

| | G. | T. | P | C | P | T. | G. | C. | P | G | C. | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STUDENT ___ | 2 $\boxed{3}$ | $\boxed{4}$ 5 | 4 $\boxed{3}$ | $\boxed{2}$ 1 | $\boxed{4}$ 3 | 2 $\boxed{3}$ | $\boxed{1}$ 2 | $\boxed{4}$ 5 | 5 $\boxed{4}$ | $\boxed{3}$ 2 | 1 $\boxed{2}$ | 4 $\boxed{3}$ |
| Correct | | | | | | | | | | | | |
| Error<br>Wrong choice | | | | | | | | | | | | |
| Wrong indic. | | | | | | | | | | | | |
| No response | | | | | | | | | | | | |
| Correction<br>Correct | | | | | | | | | | | | |
| Wrong choice | | | | | | | | | | | | |
| Wrong indic. | | | | | | | | | | | | |
| No response | | | | | | | | | | | | |
| STUDENT ___ | | | | | | | | | | | | |
| Correct | | | | | | | | | | | | |
| Error<br>Wrong choice | | | | | | | | | | | | |
| Wrong indic. | | | | | | | | | | | | |
| No response | | | | | | | | | | | | |
| Correction<br>Correct | | | | | | | | | | | | |
| Wrong choice | | | | | | | | | | | | |
| Wrong indic. | | | | | | | | | | | | |
| No response | | | | | | | | | | | | |

G = Give me
T = Take

P = Point to
C = Cover up

● = Correct response in right hand position

☐ = set presented in vertical array on an object card

1, 2, etc. = set presented in varied array on the table

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# SKILL SEQUENCES AND PROGRAMMING FOR THE SEVERELY HANDICAPPED: USE OF A MATH SKILL SEQUENCE IN THE INSTRUCTION AND EVALUATION OF SEVERELY HANDICAPPED STUDENTS

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## Introduction

Weston Williams

In the past due to limited educational opportunities, almost inevitable placement of severely handicapped citizens in large residential institutions, and lack of an effective instructional technology it was perhaps somewhat acceptable to teach severely handicapped citizens isolated attending, self-care, language, recreational, motor skills, etc. Now, however, many severely handicapped individuals will be enrolled in public school programs for as long as 21 years. Longitudinal public education coupled with more effective instructional technology and the goals of deinstitutionalization and child advocacy make it possible and imparative for us to justify skill instruction in terms of developmentally sound long term skill sequences.

The development and use of longitudinal skill sequences will be illustrated through a math skills sequence we have been generating over the past few years. It should be emphasized that the statements concerning a skill sequence made in relation to the math skill sequence are generally applicable to any skill sequence.

The first slide (Slide 1: Scope and Sequence of the Math Skills Sequence) portrays the math skills sequence scope and sequence chart. All the skills taught in the sequence are listed vertically (functional object use, imitation, sets, one-many, 1 to 1 correspondence, etc.). The objectives within each skill are listed horizontally. As can be discerned from the chart, the objectives of various skills may often be taught concurrently. For instance, a student could be learning objectives 3, 4, 5 of sets concurrently with objectives 1, 2, 3 of one-many.

The sequence delineated should not be viewed as a recipe or a prescription but rather as an illustration. This sequence is dynamic; that is, it is in a continuous process of refinement and revision based upon students' performance within it. What will be depicted here is a selected snapshot of a continuously developing sequence. In short, a math skills sequence with a sampling of activities teachers may use to supplement their daily planning will be delineated.

### Reasons for Using Skill Sequences

There are at least six reasons (Slides 2 & 3) for developing and delineating empirically verifiable skill sequences.

1. Use of developmental skill sequences should help minimize the potentially deleterious effects of changes in teachers and administrators on long term programming.

## Scope and Sequence Chart

| | Objectives | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. Prerequisites | | | | | | | | | | | | | | | | | | | | |
| 1. Imitation | 1 | | | | | | | | | | | | | | | | | | | |
| 2. Functional Object Use | 1 | | | | | | | | | | | | | | | | | | | |
| B. Sets | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | | | | | | | | |
| C. One-Many | | | | 1 | 2 | 3 | | | | | | | | | | | | | | |
| D. One-to-One Correspondence | | | | 1 | | | | | | | | | | | | | | | | |
| E. Equivalence | | | | | 1 | 2 | | | | | | | | | | | | | | |
| F. More and Less | | | | | | | | | | | | | | | | | | | | |
| 1. More | | | | | | | | | 1 | | | | | | | | | | | |
| 2. Less | | | | | | | | | | 1 | 2 | | | | | | | | | |
| 3. More/Less | | | | | | | | | | | | 1 | 2 | | | | | | | |
| 4. Conservation of Number | | | | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| G. Counting Forward | | | | | | | | | | | | | | | | | | | | |
| 1. Rational | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | | | | | |
| 2. Rote | | | | | | | | | 1 | 2 | 3 | | | | | | | | | |
| 3. Numeral Recognition | | | | | | | | | 1 | | | | | | | | | | | |
| 4. Matching Numerals to Quantities | | | | | | | | | | 1 | | | | | | | | | | |
| 5. Matching Quantities to Numerals | | | | | | | | | | 1 | | | | | | | | | | |
| 6. Ordering Numerals | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 7. Ordering Quantities | | | | | | | | | | | | | | | | | | | | 1 |
| H. Addition (Equation) | | | | | | | | | | | | | | | | | | | | |
| 1. Objects | | | | | | | | | | 1 | 2 | | | | | | | | | |
| 2. Numerals and Objects | | | | | | | | | | | | 1 | | | | | | | | |
| 3. Numerals and Lines | | | | | | | | | | | | | 1 | | | | | | | |
| 4. Numerals | | | | | | | | | | | | | | 1 | | | | | | |
| 5. Fingers | | | | | | | | | | | | | | | 1 | 2 | 3 | 4 | | |
| 6. Facts | | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | | | |
| I. Story Problems | | | | | | | | | | | | | | | | | | | | |
| 1. One-to-One Correspondence | | | | | | | | 1 | | | | | | | | | | | | |
| 2. X + Y = ___ | | | | | | | | | | | | | | | 1 | | | | | |
| 3. X + ___ = Y | | | | | | | | | | | | | | | | | | 1 | | |

2. A precise delineation of students' current functioning levels on a variety of skill sequences is more relevant to the development of viable instructional services than such descriptions as autistic, severely retarded, trainable, psychotic, emotionally disturbed, and low MA.

3. Placement of an individual along dimensions within skill sequences provides the teacher with vital information concerning the skills an individual has mastered, those that remain untaught, and in what order skills should be presented. That is, skill sequences delineate starting points and terminal objectives and enhance the possibility that essential component subskills will not be neglected.

4. Traditionally, students have been grouped on such dimensions as CA, diagnostic labels (e.g., trainable, autistic, learning disabled), physical handicap, IQ, and achievement test scores. Such dimensions rarely provide enough information to be relevant to instructional programming. In a skill sequence model students can be grouped on the basis of the skills they have mastered and the skills they should be taught next as well as CA, physical handicap.

5. Readiness in a skill sequence model consists of mastery of the prerequisite subskills which facilitate the student learning more advanced skills. Within this model a teacher does not simply wait for a student to be "ready" to learn a skill but teaches the requisite skill.

6. Skill sequences can facilitate the development of more efficient curricula. That is, if teachers carefully monitor student performance, they can obtain data which indicates the order in which skills are most readily acquired and which skills must be broken into smaller skills or reordered to facilitate acquisition. A cycle of construct a skill sequence, monitor student performance, reconstruct the skill sequence, monitor student performance . . . should lead to more efficient and valid curricula. It is only through such research that we can effectively progress from "normal" developmental skill sequences, logically derived notions of skill sequences, and psychological laboratory research to valid curricula.

## Adapting Skill Sequences to Individual Student Characteristics

It must be emphasized that a skill sequence is delineated to provide an organized set of learning objectives around which instructional programs of many types may be organized. A skills sequence is not a statement of how a task is to be taught or assessed but is a prerequisite to the delineation of specific instructional and measurement procedures.

The underlying assumption of a skill sequence is that most students learn skills in the same order. However, a skills sequence should be adapted to individual student needs (e.g., physical handicaps, blindness, deafness, muteness). A sequence may be adapted to individual students through: 1) adapting instructional procedures, 2) adapting response requirements, and 3) adapting instructional tasks (Slide 4).

### 1. Adapting Instructional Procedures

Many instructional procedures and models may be used to teach the same skill. That is, a skill may be taught through participation of all students in highly structured drills, individual instruction, a free school model, a nursery school model, and so on. Procedures or models which are most effective with individual students should be used. However, whatever instructional procedures or models are used the teacher can use the skill sequence to monitor student progress.

### 2. Adapting Response Requirements

Students can demonstrate mastery of a skill or "concept" through a variety of responses. For example, students can demonstrate mastery of the "concept" ball through nonverbal responses (e.g., touching balls, throwing balls, bouncing balls, signing, communication boards) and/or verbal responses (e.g., labeling balls, making statements concerning balls). A skill sequence should be adapted to students with specific motor and expressive language problems through allowing students to learn and demonstrate skill mastery through responses they are capable of performing.

### 3. Adapting Instructional Tasks

A skill may be taught through many tasks. For example, students can learn one to one correspondence through such tasks as giving each place setting a spoon while setting the table, giving each classmate a piece of candy, etc. However, a skill should be considered mastered only after students can functionally use the skill to operate on their everyday environment and can perform the skill across people, settings, language cues, and tasks which frequently occur. To facilitate skill mastery the tasks selected to teach a skill through should be chosen on the basis of their: a) functional use to the individual student; b) accessability or frequency of occurrence across the environment of the individual student; c) potential reinforcement value to the individual student; d) facilitation of discrimination learning; e) applicability to repeated practice; f) facilitation of later skill development; and g) facilitation of skill maintenance.

It is unlikely that one task which fulfills all the criteria delineated may be devised. However, use of these three basic tasks should fulfill the task selection criterion: a) functional tasks; b) games; and c) repeated practice tasks (Slide 5).

a. Functional Tasks: Selecting tasks on the basis of functional use involves teaching skills through functional tasks.

students frequently encounter. For example, the operation of sorting glasses and silverware can be taught through teaching students to sort glasses and silverware into separate sets at a worktable in the classroom or sorting glasses and silverware into separate sets while putting away the dishes after lunch. Obviously, sorting while putting away dishes is the more functional task.

b. Games: Tasks which facilitate the maintenance and generalization of skills should be selected. Generally, maintenance of skills can be insured through students' repeated practice or use of the skills. Teaching skills through tasks which frequently occur in environments the students inhabit should enhance skill maintenance. Skill maintenance may also be enhanced through devising games or fun activities (e.g., songs, play) which require that students use particular skills. Such games and fun activities should be made a regular component of students' daily programs and free time activities. In addition, games and fun activities have potential reinforcement value to students, and thus students are more likely to play the game and use the skills outside of the instructional setting.

c. Repeated Practice Tasks: Selecting tasks with continued applicability to repeated practice involves choosing tasks through which the student can be presented many opportunities to respond. This task selection criterion is based on the notion that frequent opportunities to respond typically results in more efficient learning than infrequent response opportunities. A problem with some functional tasks and games is that they only provide infrequent response opportunities. Thus, in some cases repeated practice tasks may have to be used in conjunction with functional tasks and games.

## Math and the Moderately and Severely Handicapped

Many educators consider most reading and math skills "academic" and nonfunctional for the moderately and severely handicapped student. The implication is that we should not waste valuable instructional time teaching math and reading to the moderately and severely handicapped. We hope to illustrate through this presentation that math skills should be vital components of longitudinal programs and that they are essential and functional components of most self-help, vocational and home living skills.

The next speakers will elaborate the above discussion through illustrating the application of a skills sequence model. Nancy Scheuerman, a teacher at Lapham School, and Barbara Swetlik, a teacher at Glenn Stephens School in Madison, Wisconsin, will describe how they have used the math skill sequence and adapted instructional procedures, tasks and response requirements to the particular needs of their students. Then, Clarence DeSpain, a school psychologist, will describe how an evaluation model can be generated from a skill sequence. He will delineate why such an evaluation model is a viable alternative to the use of traditional evaluation tools such as IQ and achievement tests.

# Math for Students With Few or No Functional Skills

Nancy Scheuerman

## I. Introduction

We will delineate the prerequisite skills to the math skills sequence and some of the initial skills in the sequence, i.e., sets, one-many and 1 to 1 correspondence. The slides are of students in one of our classrooms at Lapham School in Madison.

### A. Student Description

The students in this classroom range in age from 7-13 years. Their level of retardation may be classified as moderate to profound. Two of the students have minimal physical disabilities with mild cerebral palsy involvement (Slide 1 - students). Verbal abilities of the students range from imitative approximations of single words to one student who uses 2-3 word spontaneous phrases. Two students use a picture communication board as an additional form of expressive language (Slides 2, 3, 4 - communication books). One student is presently being taught sign language as an alternative method of expressive communication (Slide 5).

### B. Educational Background

Three years ago, several of these students had been excluded from public schools due to severe behavioral problems and/or nonverbal communication skills. Some students were not toilet trained, could not put their own coats on, would not follow simple one-component directions, had very limited receptive language and only used simple sounds for expressive language. Initial programming for these students consisted of behavioral control programming, self-help instruction and receptive language tasks.

### C. Reasons for Using Math Skills Sequence

As behavior problems decreased and receptive language skills increased, we began to develop more advanced cognitive and language programs for the students. We spent a great deal of time selecting math skills which we thought appropriate for the students. Initially we attempted to teach the students numeral identification (Slides 6 & 7). At that time we had not yet delineated a math skills sequence, and we had very minimal success with the numeral identification program. While developing the math skill sequence, we were able to delineate the math skills which should be taught prior to and currently with numeral recognition.

Through following the skill sequence from the prerequisite skills, through set relationships and subsequent skills, we have been able to provide appropriate sequential math tasks for the students. Now, the students not only identify numerals (Slide 8), but can also match numerals to their appropriate quantities (Slide 9) and match quantities to numerals (Slide 10).

The skill sequence we have developed provides the flexibility which is essential to this group of students. For example, the students could sort objects into sets on the basis of one dimension such as shape, but could not master the higher level sets skill of making sets of three unrelated objects as the students in this slide are doing (Slide 11). The flexibility of the sequence allowed us to move on from sorting objects on the basis of one dimension into sets, to tasks such as 1 to 1 correspondence and later return to the higher level set skill of making sets of three unrelated objects.

One of the major advantages of this skill sequence is that response requirements can be readily modified according to students' verbal abilities. For instance, this class of students usually respond in a nonverbal manner due to their limited expressive language. However, verbal students can be required to use verbal responses.

## II. Prerequisites

The prerequisites of imitation, play skills and functional object use may be taught concurrently.

### A. Imitation

During the first year of public school programming with these students we taught them simple direction following skills which involved gross and fine motor imitation (Slide 12). Imitation was taught to facilitate spontaneous motor imitation of the teacher and other people in the students' environment. The imitation prerequisite of the skill sequence provides a method for instruction, imitation of a teacher modeled response, and is a good indicator of a student's level of cognitive functioning.

### B. Play Skills

Initially, we also taught appropriate play skills with common objects (toys) (Slides 13 & 14). One reason appropriate play skills were taught was to insure that students would be able to manipulate the objects used in math and other instructional programs in a functional and task appropriate manner. Thus, we gave special attention to objects which we would eventually use in teaching math and other skills in order to familiarize the students with their use and to develop the objects into appropriate reinforcers (Slide 15). The success of an instructional program used to teach a particular skill can depend on the intrinsic reinforcement value of the materials used to teach the skill.

## C. Functional Object Use

Through being taught functional object use students learn the function of objects and functional relationships between objects (Slides 16 & 17). Knowledge of the functional use and functional relationship between objects facilitates the acquisition of higher level skills. For example, if students know the functional relationship between objects (e.g., a paintbrush and a box of watercolor paints), they should more readily learn 1 to 1 correspondence skills through tasks which involve the objects (e.g., assigning a paintbrush to each box of paints - Slide 18).

## III. Sets

The first math skill delineated by the sequence is sorting objects into sets. There are nine objectives in the set component of the skill sequence and we will illustrate only a sampling of the objectives.

One of the initial set's objectives is to teach students to sort two different objects into separate sets (e.g., "Put the bears here, the blocks here." - Slides 19, 20, 21). First students are taught to sort such objects as blocks and bears which are the same color and size along the dimension of form. Later students are taught to sort on the basis of different dimensions (e.g., color, size).

One of the higher level set skills objectives is to teach students to create sets of related objects specified by the teacher (Slide 22); then to make a set of related, but unlike objects; and finally to make a set of unlike and unrelated objects (Slide 23). Joining or making sets of objects is the basis of addition.

## IV. One-Many

One-many may be taught concurrently with sets or subsequent to completion of the sets objectives.

The first objective in the one-many component of the skill sequence is to teach students to discriminate between one and many objects which are presented as separate sets. That is, students may be asked to indicate which set has one or many objects (Slide 24). The students progress to giving the teacher or taking one or many objects from a single set of objects when given a verbal direction (Slides 25 & 26). Nonverbal students may learn and demonstrate knowledge of the concept of one-many through nonverbal responses. The adaptability of the math sequence allows the teacher to concurrently have verbal students learn the skill of asking for one or many objects. For instance this student is asking for one balloon (Slide 27). Students quickly learn to ask for many when they are requested to indicate whether they want one or many cookies or candies. In later components of the skill sequence (e.g., 1 to 1 correspondence, more-less, counting) students learn to elaborate upon one-many to discriminate between one and two objects, eight and ten objects, etc.

One-many can be taught through a multitude of different tasks. However, if students have motor problems, it may be difficult for them to respond correctly when the task objects are difficult to manipulate (Slide 28). In the case of this student with cerebral palsy, it would be more appropriate to initially use easily manipulated objects or allow a touch response.

## V. 1 to 1 Correspondence

We will delineate the sequence we use to teach 1 to 1 correspondence and a variety of tasks the skill may be taught through.

(Slide 29) pennies-candy
(Slide 30) play dough-muffin tins
(Slide 31) flannel-vertical
(Slide 32) flannel-horizontal
(Slide 33) flannel-dominoe array
(Slide 34) paper-pencil task

The 1 to 1 correspondence skill is an essential prerequisite to students learning the concept of equivalence. It is important to teach 1 to 1 correspondence across a great number of tasks to facilitate success in equivalence. We initially teach 1 to 1 correspondence through tasks where students can easily perceive when they have not assigned objects in a 1 to 1 correspondence such as giving each cup a straw (Slide 35). Then we progress to teaching students to place objects on top of one another (e.g., put a bear on each block - Slide 36) and eventually place objects next to each other (e.g., put a bear next to each block - Slide 37). Through this 1 to 1 correspondence sequence we have not only taught the 1 to 1 correspondence skill, but concurrently have taught preposition concepts (e.g., on, next to) and prepared the students to learn to make equivalent sets.

## IV. Insuring Functional Use and Performance of Math Skills Across People, Settings, Language Cues and Tasks

In order to illustrate how a teacher can make math skills functionally useful for students, we will illustrate how the skills can be used across normal classroom activities. The teacher can incorporate the use of math skills into each of these activities and thus provide additional teaching trials, provide a functional way for students to use the skills, and insure that students can perform the skills across people, settings, language cues and tasks.

(Slide 38) Opening - Students can use 1 to 1 correspondence to determine who is absent.

(Slide 39) Reading -- The conjunction and necessitates the previous skill of creating a set. A student's failure to read and comprehend "and" could be due to lack of knowledge of how to combine objects or join sets.
(Slide 40) Recess - Students can be requested to take one or many balls out to recess.
(Slides 41 & 42) Milk break - Students can be requested to sort cups and milk cartons into separate sets.
(Slides 43 & 44) Lunch - Students can be requested to create a set of a hot pack, cold pack and milk.
(Slide 45) Music - 1 to 1 correspondence. Students can be requested to give a bell to each classmate.
(Slide 46) Art - Students can be requested to bring scissors and paintbrush to class. That is, make a set of scissors and paintbrush.
(Slide 47) Academics - Students can be requested to bring a pencil and book to class.

A vital component of an instructional program is to insure that students use skills learned at school across people, tasks and language cues which frequently occur at home. One way to insure student performance of skills across tasks which occur at home is to suggest home activities for parents at conference times or in a progress report.

(Slide 48) Sorting sets - In father's workshop the student could be requested to sort nails and screws.
(Slide 49) One-Many - While setting the table with 'sis' the student could be requested to get one knife.
(Slide 50) 1 to 1 Correspondence - While making cupcakes with mom the student could be requested to put one cupcake liner in each hole of a cupcake tin.

Obviously, there are numerous relevant instructional situations at home. However, as teachers we can only suggest a range of sample activities, inform parents of the skills being taught and allude to the multitude of spontaneous home teaching situations.

## Math for Higher Functioning Students

Barbara Swetlik

### I. Introduction

#### A. Description of Students and School Setting

I will describe how another teacher and myself have implemented the math sequence with 13 moderately to severely handicapped students from two classes at Glenn Stephens School. Most of the students, who range in age from 5-12, have been enrolled in an education facility or day care center since the age of 3. In general, these students are functioning at a higher level than the students Nancy described. They all are ambulatory, verbally and motorically imitative, and have basic skills in reading, language, math, and self-help. However, like the students in Nancy's class, they manifest visual and behavioral problems, and have deficits in most cognitive, motor, and language areas. In short, these students need school programs offering highly systematic and intensive intervention to foster their skill development.

### B. Placing the Students in the Sequence

In contrast to Nancy's students, the students in our classes had already mastered the math prerequisites (imitation and functional object use) when we began using the math sequence (Slide 2). Evaluation indicated that they could make sets from a verbal cue, identify and make sets of one and many, and match objects in 2 sets in 1 to 1 correspondence. They could also count objects and identify numerals from 1 to 10. Thus, these students were taught higher level skills on the math skill sequence. We began with a review of 1 to 1 correspondence and initial instruction in equivalence.

## II. Adopting the Sequence to Higher Functioning Students

### A. 1 to 1 Correspondence

The students in our classes could already put objects in 1 to 1 correspondence at the start of the program. We extended their 1 to 1 correspondence skills by teaching them to label sets as having just "enough," "not enough," or "too many." If the sets were not equivalent, the students were asked, "What's wrong?" and "What can you do?" Students were then taught to indicate how many items should be added (Slides 3 & 4) or taken away (Slides 5 & 6) so that there would be just enough objects in both sets.

Students were presented repeated practice tasks (like those just shown - Slides 3 & 4), games, and functional tasks (Slides 7 & 8).

### B. Equivalence

The equivalence program was an extension of the skills the students had acquired in 1 to 1 correspondence. That is, emphasis was placed on the word "equals" and using the equal sign as alternative ways of expressing the concept of enough taught in 1 to 1 correspondence.

In the equivalence program the teacher placed a set in front of the students and asked them to make a set equal to hers and place an equal sign between them (Slide 9). In teaching this skill students were asked to indicate if the sets were equal or not equal and how they could tell.

Students could solve equivalence problems (Slide 10) in two ways. First, they could match the objects in each set in 1 to 1 correspondence and indicate that the sets were "equal" or "matched" (Slide 11). Second, students who were able to count simply counted each set and said, "I counted, 3 = 3" (Slide 12). When the students who counted were asked how they could tell that the sets were equal, they then had to demonstrate that their answer was correct by using 1 to 1 correspondence. Thus, we built in a procedure for students to check their own work. In fact, if students wrongly stated that 3 = 3 and both sets did not contain 3 members, we often did not correct them but asked them how they could tell. When they lined up the objects in 1 to 1 correspondence, they could easily see that they had made a mistake (Slide 13) and how they could correct it (Slide 14). Since we all frequently make mistakes, it is important to teach students procedures for checking their answers versus always setting up situations where errors do not occur.

Examples of functional situations where the students used equivalence skills were dealing cards so that everyone had an equal number (Slide 15) and having students divide themselves into equal groups for relay races (Slide 16).

### C. More and Less

In the more and less program, students were taught to compare sets and use 1 to 1 correspondence to determine which set had more or less members (Slide 17). Our students use more and less skills frequently throughout the day, especially when they are playing games and need to determine the winner (Slides 18 & 19).

### D. Rational Counting

Rational counting is probably the most commonly found objective in any math curriculum. Following the skill sequence, our students were taught to: 1) count objects and indicate how many (Slide 20); 2) count out a number of objects from a larger group (Slide 21); 3) count objects in crooked and varied arrays (Slide 22); 4) count objects which appear then disappear such as cars going down the street (Slide 23); and 5) count objects without touching them (Slide 24). This sequence leads students toward more independent skills and attempts to include counting situations they will encounter as adults.

We incorporated many games in the program in order to maintain student interest and provide repeated practice. These games included counting songs (Slide 25), bouncing a ball a given number of times (Slide 26), and counting the dots on a dice and moving a certain number of spaces on a game board (Slide 27).

We also set up situations through story problems that permitted repeated practice but provided variety (Slides 28 & 29). Rational counting skills were used throughout the day, as in cooking (Slide 30) and in art class (Slide 31).

### III. An Illustration of How Math Skills Are Essential Components of Community Survival Skills: Money

To demonstrate how many math skills are incorporated in community living tasks (and in rest of our school program), I will describe the money program we have used with our students.

First, students were required to sort money from similar looking objects (Slide 32) and then coins from each other (Slide 33). These are examples of sorting tasks as found in the set program. Students then learned to count pennies and tell how much they were worth in cents (Slide 34). This task requires rational counting skills.

When students could count pennies accurately, they went to a classroom store (Slide 35). They were taught to read price tags (which requires numeral recognition), choose an item to buy, and determine if they had enough money. They also learned that sometimes they did not have enough money (e.g., 3¢ ≠ 10¢) (Slide 36). This task involves the skills learned in equivalence and the "What is wrong?" question again. (That is, to solve this problem the teacher would ask, "What is wrong?" and "How many more pennies do you need?") Lastly, students learned to wait for their change if they hadn't spent all of their money (Slide 37).

As a result of applying the skills learned in math, these students learned to go to a simulated store, make desired purchases or save their money for a larger item, and wait for the change. We feel that the skills learned in the math program greatly facilitated their acquisition of these money skills.

## Program Assessment: A Model for Measuring Student Progress

Clarence DeSpain

Very recently Hobbs (1975), in his book, The Futures of Children, summarized the findings of "The Project on Classification of Exceptional Children" which was undertaken at the request of Elliot Richardson, then Secretary of Health, Education and Welfare. Among the Project's findings relative to the use of general intelligence testing with children in schools was the following:

> The routine use of intelligence tests ... in the schools ... is (not) defensible. Optimum individual development, not maximum organizational efficiency, should be the goal of the schools. Schools should have resources sufficient to allow everyone to demonstrate his competence through performance. There is little justification for relying on a predictor of performance (an intelligence test, for

> example) when performance itself can be the basis of classification--should classification be, in fact, required. (p. 48)

The model that we are presenting here is, in part, a response to Hobbs admonition. It should also be pointed out that the model you are going to see is only one component of a broader model that encompasses a number of systems for evaluating such things as interventions and student placements.

As psychologist assigned to the joint Madison Public Schools, University of Wisconsin MAZE (The Madison Alternative for Zero Exclusion) Project, I have been charged with the task of designing a system of evaluations that is: 1) valid for low functioning populations; 2) something other than traditional testing; and 3) capable of storing and retrieving accumulated data. The evaluation model presented here is the result of attaching the above criteria to a math teaching program. The model is designed to flow out of the program format (objective setting within a skill sequence) with close attention to the style of teaching required to make it operative. The model was developed "in committee" with teachers presently using the math program and the Project Research Assistant, Dr. Weston Williams.

The model is portrayed in Figure 1 and basically consists of seven steps:

1. Box A: Prior to formally assessing students become familiar and comfortable with them. Informally assess students' skills and what environmental events control their behavior. Use information from this informal assessment to determine optimal assessment conditions.

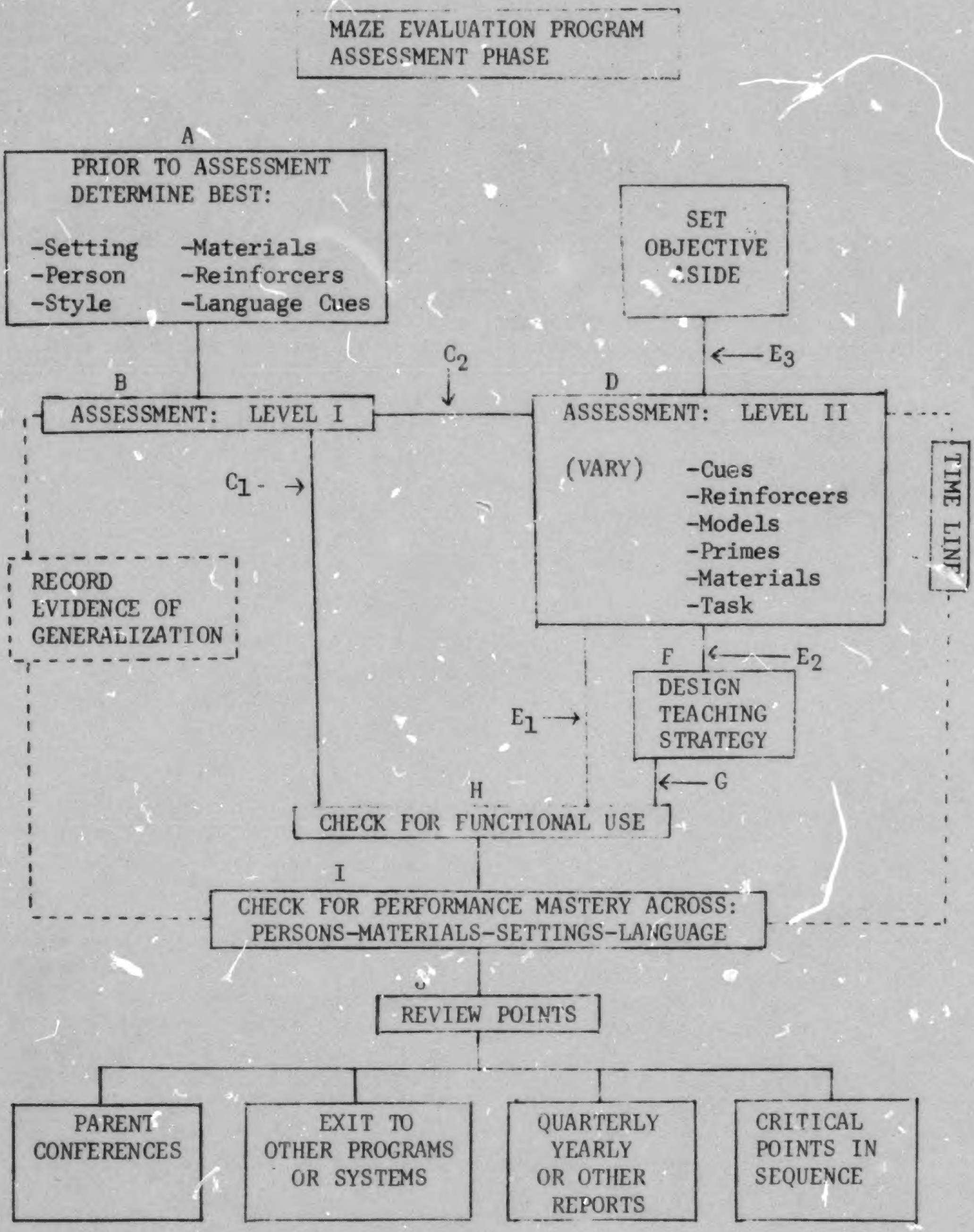
2. Box B: Assessment Level I - Assess one or more objectives from the skill sequence under optimal but controlled conditions. If students fail the objective, go to Box D (Assessment Level II); if they pass, go to Box H (check for functional use).

3. Box D: Assessment Level II - If students could not perform the skills required by an objective in Level I assessment, assess students' behavior under varied conditions to determine under what conditions (e.g., cues, models, prompts, reinforcement) they can perform the skills. Use information from this assessment to develop an instructional strategy (Box F).

4. Box F: Teach students the target skills.

5. Box H: Assess student mastery of skills. First verify that they can use the skill in the performance of functional tasks which frequently occur (e.g., setting the table, dressing). If they use the skill across functional tasks, formally check skill performance across persons, materials, settings and language cues (Box I).

Figure 1


MAZE EVALUATION PROGRAM
ASSESSMENT PHASE
A
PRIOR TO ASSESSMENT DETERMINE BEST:
-Setting
-Person
-Style
-Materials
-Reinforcers
-Language Cues
SET OBJECTIVE ASIDE
$C_2$
$E_3$
B
ASSESSMENT: LEVEL I
D
ASSESSMENT: LEVEL II
(VARY)
-Cues
-Reinforcers
-Models
-Primes
-Materials
-Task
TIME LINE
$C_1$
RECORD EVIDENCE OF GENERALIZATION
F
$E_2$
DESIGN TEACHING STRATEGY
$E_1$
G
H
CHECK FOR FUNCTIONAL USE
I
CHECK FOR PERFORMANCE MASTERY ACROSS: PERSONS-MATERIALS-SETTINGS-LANGUAGE
J
REVIEW POINTS
PARENT CONFERENCES
EXIT TO OTHER PROGRAMS OR SYSTEMS
QUARTERLY YEARLY OR OTHER REPORTS
CRITICAL POINTS IN SEQUENCE

6. Box I: Verify student performance of skills across persons, materials, settings and language cues.

7. Box J: Review (reassess) student skill performance.

In our judgment the evaluation model has the following attributes:

Validity - The model measures student performance through criterion based objectives under optimal student performance conditions.
Reliability - The model provides for confirmation of student performance across persons, settings, and materials.
Generalizability - The model can be adopted for use across a wide variety of instructional programs.
Ecological - The model insures functional performance of skills across the total of the student's environment.
Conserving - The model allows for an orderly recording of achievement and rate of achievement for every student so that retrieval of information is easily achieved.
Flexible - The model encourages all key figures in the student's environment to be evaluators.

The following narrative attempts to explain the flowchart. The model is divided into two broad assessment categories: I) Initial Assessment, which includes a pre-assessment inventory, two levels of actual assessment and a teaching strategy; and II) Skill Mastery Assessment, which includes an assessment of the functional use of a skill, plus assurance that the skill is performed across persons, cues, materials.

## I. Initial Assessment

### A. Determination of Optimal Assessment Conditions

Our first assumption is that in order to make a valid assessment of students' performance on a given objective, we must provide conditions that will elicit the students' optimal performance. Thus, it is important to become familiar and comfortable with students before you begin formally evaluating them. This will allow you to make the evaluation situation pleasant and nonthreatening, facilitating a valid assessment of the students' skills. With new students you may have to spend several days playing with them and presenting evaluation tasks informally. Through informal assessment, prior to initial assessment Level I, attempt to determine:

1. the optimal setting for administering the assessment (e.g., perhaps the table where students usually perform tasks):

2. the person whom is most likely to elicit optimal performance from the students;

3. materials familiar to the students which should potentially insure optimal performance;

4. potential reinforcers which have in the past elicited good performance;

5. language cues to which the students have demonstrated they can correctly respond;

6. a style of task presentation (e.g., the natural style of the person for whom the students work well) that elicits optimal performance from the students.

B. Assessment: Level I

Once the potentially optimal conditions have been delineated an assessment of one (or more) selected objectives is administered under controlled conditions but conditions which should elicit optimal performance.

C. First Decision Point ($C_1$ or $C_2$)

$C_1$ - If the student performs the objective(s) at a predetermined acceptable criterion, the decision ($C_1$) is to move to an assessment of skill mastery (H, I, J) but at a later date.

$C_2$ - If the student does not perform at the acceptable criterion in Level I, the decision ($C_2$) is to move immediately to Level II of assessment (D).

D. Assessment: Level II

If students could not perform skills in Level I assessment, Level II requires the evaluator to assess students' performance under varied conditions (e.g., varied cues, reinforcers, models, primes, materials, tasks) in an attempt to determine under what conditions the student can correctly perform a skill. The students' performance in various conditions should be carefully recorded.

E. Second Decision Point ($E_1$, $E_2$, or $E_3$)

$E_1$ - If Level II assessment indicates the students can correctly perform a skill across varied conditions, skill mastery may be assessed (H, I, J).

$E_2$ - If students can at least partially perform the skills required under varied conditions, the varied conditions which produced correct performance are incorporated into a teaching strategy (F) for the students.

$E_3$ - If it is found that students cannot perform the skills required by the objective under any of the varied conditions, the decision ($E_3$) is to set the objective aside until there is evidence that students can learn the skills required by the objective.

## F. Teaching Strategy

Whoever is charged with designing students' programs will use the data from the Level II assessment to design and implement an appropriate instructional program.

## G. Third Decision Point (G)

When students demonstrate that they have learned the skills required by the objective through an instructional program skill mastery (H, I, J) is assessed.

## II. Skill Mastery Assessment

Subsequent to instruction on an objective (F) or acceptable performance in Level I assessment (B) students' skill mastery is assessed (H, I, J).

A skill may be considered mastered only after students can functionally use the skill and perform the skill across people, settings, language cues, tasks and materials which frequently occur. At this point it is necessary to make a distinction between skill mastery and generalization. Generalization may be said to have occurred when after students have been taught to perform a skill across a limited number of people, settings, language cues and tasks without further instruction they perform the skill across additional settings, people, tasks and language cues.

Skill mastery may be but does not have to be the same as skill generalization. Obviously, if after instruction across a limited number of settings, people, functional tasks and language cues students demonstrate skill mastery (generalize the use of skills across additional tasks) they will move rapidly through the skill sequence. However, the possibility exists that some students will not generalize the use of a skill and may have to be taught to perform the skill across all the designated settings, people, functional tasks and language cues before they demonstrate skill mastery.

An essential component of facilitating skill mastery should be the involvement of the students' parents or guardians. That is, through parent conferences parents should help the teacher determine the skills their children are being taught. In addition, parents should be taught how to request and teach their children to use the skills on functional tasks at home. For instance, if students are learning one-to-one correspondence, the children's parents can be requesting them to set the table at home. To facilitate the parents' learning how to teach and require their children to use skills at home periodic workshops can be held where parents and teachers go over the curriculum and procedures for adapting it to functional home-living tasks.

## H. Functional Use

The most critical feature of the model is (H) the assessment of students' functional use of a skill. The teacher with assistance from students' parents or guardians should report what functional tasks students perform a skill across. The report should indicate what cues the performance of tasks (e.g., the task itself, verbal language cues) what the tasks are and the date. That is, both parents and teachers should have a similar data sheet and when they observe students independently perform a skill on a function task they should record the cue, task and setting and date. The following recording format appears to be appropriate.

| Skill | | Task Setting<br>School | Home | Other |
|---|---|---|---|---|
| Less | tasks<br>cues<br>dates | | | |
| More | tasks<br>cues<br>dates | | | |
| Equivalence | tasks<br>cues<br>dates | | | |
| 1-to-1 Correspondence | tasks<br>cues<br>dates | | | |
| One-Many | tasks<br>cues<br>dates | | | |
| Sorting | tasks<br>cues<br>dates | | | |

If the data indicates that over time a student performs a skill across functional tasks, people, settings and language cues, then a formal test of skill mastery across these dimensions should be implemented (I).

## I. Confirmation of Skill Performance Across People, Settings, Materials and Language Cues

Students are required to demonstrate that they can perform a skill across a variety of selected persons, materials, settings and language cues. Skill mastery is confirmed when several persons have verified that the student can perform a skill across functional tasks and across persons, materials, language cues, and settings.

## J. Review Points

Students' mastery of skills should be periodically assessed, reassessed and reported. The assessment, reassessment and reporting of skill mastery should coincide with: a) parent conferences, b) quarter and/or semester periods, and c) the students' mastery of selected critical curriculum objectives. When any one of the events, a, b, c occurs teachers should use their data on students' skill acquisition and if appropriate student performance on a formal evaluation of skill mastery to list at least·

1. For what people a student performs the skill;
2. In what settings a student performs the skill;
3. Across what materials a student will perform the skill;
4. In response to what language cues a student will perform the skill;
5. Across what functional tasks a student has demonstrated that he/she can perform the skill.

Student performance data may be summarized on a student evaluation sheet (report card) of the following form.

| Skill | Mastered | Cues | Tasks | Instruct. in Prog. | Cues | Tasks |
|---|---|---|---|---|---|---|
| Less | | | | | | |
| More | | | | X | "Take more"<br>"Give me more"<br>Etc. | Pennies<br>Food at snack<br>Etc. |
| Equivalence | X | "Find equal sets"<br>"Are they equal"<br>"Make them equal"<br>Etc. | Pennies at the store<br>Candy at home<br>Teams at recess<br>Etc. | | | |
| 1-to-1 Correspondence | X | "Are there enough"<br>"Are there too many"<br>"Give each ___ a ___"<br>"Put a ___ on each ___"<br>"Put a ___ next to each ___"<br>Etc. | Setting table at home<br>Passing out food at lunch<br>Choosing teams at recess<br>Etc. | | | |

Comments:

Suggested Home Activities:

This information can then be used for at least the following purposes:

1. Reporting to parents and the school system a student's progress.
2. Assessing a student's rate of progress. That is, how fast a student is progressing through the skill sequence.
3. Evaluating the skill sequence. That is, if data from many students indicates that most students are requiring an unusual amount of instruction to master a skill, it

may be that the skill sequence fails to delineate appropriate prerequisites of instructional procedures necessary for the acquisition of that skill.

4. Evaluating the effectiveness of a teacher's program. If a teacher is moving his/her students through skills at an unusually rapid pace, the teacher may request that his/her instructional program be closely evaluated to determine why it is usually effective so that others may emulate it. Conversely, if a data indicates that students are mastering few or no skills, a teacher may request that a teacher who is experiencing more success help him/her restructure his/her program or request that a curriculum specialist evaluate the program.

## Evidence of Generalization

Concurrent to and following instruction of a skill (F) persons in the students' environment should be aware of the instructional objectives and record (anecdotally) any evidence of generalization of the skill being taught.

## Importance of the Time Line

There is an emphasis on recording rate of student progress through critical objectives. This provides information on student learning rates. Student learning rates are critical in that they can be used to make statements (predictions) concerning a student's learning potential (rates). Information on what skills students can perform and student acquisition rates can be used in the stead of traditional testing (e.g., IQ, achievement tests). We believe this information will be more valid and viable then information gleaned through traditional evaluation.

## Conservation of Accumulated Data

Finally, the model lends itself to the conserving (storing and retrieving) of critical data and potentially provides useful data to all who have use for it (parents, teachers, administrators, psychologists). The chart portrayed below is for use with the evaluation model presented. It is included with the caution that neither it nor the model has been given longitudinal testing in the classroom.

## Reference

Nobbs, Nicholas. The futures of children: Categories, labels, and their consequences. N.Y.: Jassey-Bass Publishers, 1975.

Figure 2

STUDENT ____________ YEAR ____________ PROGRAM ____________

SCHOOL ____________ SEMESTER ____________

| SKILLS & OBJECTIVES | ASSESSMENT: LEVEL I | | ASSESSMENT: LEVEL II | | FUNCTIONAL USE | | | PERFORMANCE MASTERY | | | | | | | | CONFIRMING PERSON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Persons | | Setting | | Mater. | | Lang. | | |
| | ✓ | Date | ✓ | Date | ✓ | ✓ | ✓ | ✓ | Date | ✓ | Date | ✓ | Date | ✓ | Date | |
| 1. IMITATION | | | | | | | | | | | | | | | | |
| MOTOR | | | | | | | | | | | | | | | | |
| VERBAL | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 2. SETS | | | | | | | | | | | | | | | | |
| 2. | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 3. ONE-MANY | | | | | | | | | | | | | | | | |
| 3. | | | | | | | | | | | | | | | | |

ETC.

# SKILL SEQUENCES AND CURRICULUM DEVELOPMENT: APPLICATION OF A RUDIMENTARY DEVELOPMENTAL MATH SKILL SEQUENCE IN THE INSTRUCTION AND EVALUATION OF SEVERELY HANDICAPPED STUDENTS

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Abstract: This paper attempts to delineate the components of a functional math skill sequence (i.e., math skills with utility across environments) from zero skills through rudimentary addition. A skill sequence is not a statement of how a skill is to be taught or assessed but is rather a prerequisite to the delineation of specific instructional and measurement procedures. Strategies for adapting the skill sequence to individual students through: a) adapting instructional procedures; b) adapting tasks and materials; and c) adapting response requirements (e.g., verbal vs. nonverbal responses) are delineated. Evaluation procedures and skill mastery criteria that may be employed in conjunction with the sequence are articulated. It is emphasized that skills should be taught through tasks which should facilitate the acquisition, functional use, maintenance and performance of skills across environmental configurations. Sample tasks which potentially fulfill these criteria are delineated for each skill in the sequence. It is emphasized that the sequence presented here should not be viewed as a recipe but as a skill sequence with suggested instructional procedures, tasks and materials, evaluation procedures and response requirements that teachers may use to supplement their daily planning.

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[2] Supplemental revision of "Skill Sequences and Curriculum Development: Application of a Rudimentary Math Skill Sequence in the Instruction and Evaluation of Severely Handicapped Students," W. Williams, P. Coyne, F. Johnson, N. Scheuerman, B. Swetlik, and R. York, May, 1975. Extensive Revision of "A Rudimentary Developmental Math Skill Sequence for Severely Handicapped Students," W. Williams, P. Coyne, F. Johnson, N. Scheuerman, J. Stepner, and B. Swetlik, August, 1974.

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## I. Introductory Statement: Purpose of the Sequence and How to Use It

Educational objectives for severely handicapped students should encompass skills which will enhance their ability to effectively interact with objects, events and people across environments. Teaching students to functionally use skills related to the concepts of sets, one-many, one-to-one correspondence, equivalence, more and less, counting, addition, subtraction, money, time-telling and calendar should enhance students' abilities to effectively interact with their environment. This paper will attempt to communicate the current thinking of several classroom teachers of severely handicapped students regarding the components of a functional math skill sequence (i.e., math skills with utility across environments) from zero skills through rudimentary addition.

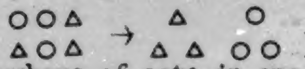
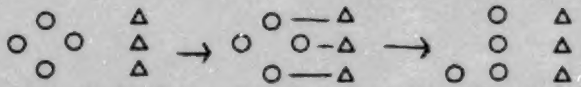
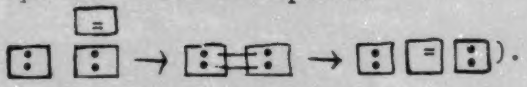
The sequence delineated should not be viewed as a recipe or a prescription, but rather as an illustration. This sequence is dynamic; that is, it is in a continuous process of refinement and revision based upon the students' performance within it. Thus, what is depicted here is a selected snapshot of a continuously developing sequence. In short, a math skills sequence with a sampling of activities teachers may use to supplement their daily planning is delineated.

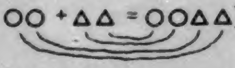
At least three factors necessitate the development and delineation of empirically verified math skill sequences or curricula for severely handicapped individuals. One, sequential programming of mathematical skills provides teachers with basic notions of what math skills to teach and when to teach them. That is, a skill sequence delineates starting points, terminal objectives, and enhances the possibility that essential component skills will not be neglected. Two, potentially there are many math skill sequences which may be used in the instruction of severely handicapped students. However, it is advantageous for students to progress through one flexible sequence rather then components of several potentially incompatable sequences. Developmental skill sequences should minimize the potentially deleterious effects of changes in teachers and administrators on the long term programming of severely handicapped students. Three, most existing math skill curricula are not directly applicable to severely handicapped students. They are not applicable for at least four reasons: 1) they do not allow for sufficient practice or instruction of skills; 2) they are locked into instructional procedures (e.g., large group instruction, worksheets) which are often not appropriate for individual severely handicapped students; 3) they teach the skills through relatively nonfunctional tasks and thus the skills taught are often nonfunctional for severely handicapped students (e.g., they may teach one-to-one correspondence by requiring the students to match circles to squares while a more functional task might require students to match straws to cups); 4) they require that the students process relatively high level receptive and expressive language repertoires.

The applicability of many of the components of the skill sequence articulated below has been empirically verified for severely handicapped students. However, at this point no severely handicapped student has progressed through the entire sequence of skills. Thus, although the efficacy of individual components has been empirically verified, the entire sequence has not.

## II. Sequence Rationale

The underlying rationale for the sequence evolved from the notion that there are basic concepts and operations which may be utilized in the solution of most math problems. In the sequence articulated here the fundamental concepts encompass sets, counting and equivalence.

The first step in the sequence (See the Scope and Sequence Chart) involves teaching students to sort objects into sets (i.e., place objects that vary along at least one dimension into separate units of space (e.g., ). Next, students are taught to match the members of sets in one-to-one correspondence (e.g., ).[3] When students demonstrate that they can use the operation of one-to-one correspondence to match sets on the basis of quantity, they are taught equivalence. That is, students are taught to utilize the operation of one-to-one correspondence to determine if sets are equivalent and to separate equivalent sets by an equals sign (e.g., ).

Subsequent to equivalence the students are taught addition. Addition as conceptualized in this program involves the student joining two sets of objects to form a new set (e.g., a set of circles and/plus a set of triangles is/equals a set of circles and triangles or ○○ + △△ = ○○△△). Addition also entails the students using the operation of one-to-one correspondence and/or rational counting to determine if the sets on both sides of the equals sign contain the same quantity (e.g., ).

Concurrent to teaching the concepts of sets, one-to-one correspondence, equivalence and rudimentary addition, the concepts of one-many and more/less are taught. It may be helpful to translate the rationale into more concrete examples from the math skill sequence.

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[3] The lines indicate the student's performance of the one-to-one correspondence operation.

In the following paragraphs we will briefly describe selected components of the skill sequence and how they relate to each other.

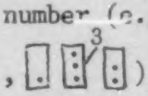
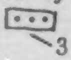
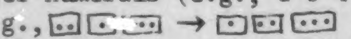
Sets: The sets component of the skill sequence teaches students to sort objects along specified dimensions (e.g., form, color, size). Concurrent with learning to sort objects along selected dimensions students learn the names of the object dimensions (e.g., object names, color, size). Objective 8 of the sets component teaches students to join sets of objects to make a new set (e.g., make a set of blocks and/plus bears). Joining sets is the basis of addition.

One-Many: In the one-many component of the skill sequence students are taught to discriminate between one and many objects. In later components (one-to-one correspondence, more/less, counting) this skill is elaborated to teach students to discriminate between one and two objects, eight and ten objects, etc.

One-to-One Correspondence: In the one-to-one correspondence component students are taught to align the members of two sets in one-to-one correspondence. The students learn to solve three basic problems through aligning members of sets in one-to-one correspondence: 1) equivalence - the sets to be aligned in one-to-one correspondence have the same number of members; 2) addition - the sets to be aligned in one-to-one correspondence are not equivalent ( $: \neq \vdots$ ) and the students learn to determine and indicate there are "not enough" members of one set and they have to add/plus more objects to one set to make the sets equal. For instance, although students do not know the concept of 2 or 4 they learn to use one-to-one correspondence to add 2 more objects to the set of 2 to make it equivalent to the set of 4. This problem is a concrete form of the more abstract problem $2 + \underline{\quad} = 4$. In later components of the skill sequence students will learn the concepts of 2, 4, etc., that 2 is less than 4 and to solve problems presented in the abstract form of $2 + \underline{\quad} = 4$; 3) subtraction - the sets to be aligned in one-to-one correspondence are not equivalent and the students learn to use one-to-one correspondence to determine and indicate that one set has "too many" objects and they have to "take away"/"subtract" members from one set to make the sets equal. For example, although students do not know the concept of 3 or 2 they learn to use one-to-one correspondence to take one member away from the set of 3 objects to make the sets equal. This is a concrete form of the more abstract problem $3 - \underline{\quad} = 2$.

Equivalence: Equivalence is an extension of one-to-one correspondence. In the equivalence component of the skills sequence students learn the terms "equal," "not equal" and the equals sign "=" which correspond to the terms "enough" and "not enough" they learned through one-to-one correspondence. Equivalence problems may be solved by two methods: 1) counting the objects in two sets and indicating that 3 equals 3; and 2) aligning the members of each set in one-to-one correspondence to determine set equivalence. Students who use the first method are taught a self-regulation procedure for detecting and correcting their own errors. That is, if a student incorrectly or correctly indicates that 3 equals 3, the teacher asks, "How can you tell?" Then the student aligns the members of the sets in one-to-one correspondence to check and if necessary correct the answer. Throughout the remaining components of skill sequence similar self-regulation procedures are delineated to teach students to detect and correct their own mistakes.

More and Less: In the more and less component of the skill sequence students learn to use one-to-one correspondence to determine which sets have more or less members. At this point in the sequence students have not learned that 4 is more than 3 or 8 is less than 10, etc. Thus, they determine more and less by aligning members of sets in one-to-one correspondence and designating the set with at least one member left over as the set with more. Conservation of number is introduced in the more and less component of the skill sequence. That is, students are taught to determine the equivalence of sets even when the sets are not aligned in one-to-one correspondence
    . . . .      . . .  .
(e.g., ..".. or .."... or . " . ) or the arrangement of the members of one set is significantly changed after equivalence has been
                  . .  . .   . . . .
determined (e.g., . . " . . → . . " . . ). Subsequent to more and less, in the ordering numerals and ordering quantities components of the skill sequence, students learn that 2 is less than 4 and 8 is more than 7, etc. and then they no longer have to rely solely on one-to-one correspondence to determine which set is more or less.

Counting Forward: As delineated above addition problems can be solved through one-to-one correspondence. Addition problems may also be solved through counting the number of additional objects needed to make 2 sets equal ( : + __ = ⋮ ). In the counting forward component of the skill sequence students learn to rationally count (count objects), rote count (count without object referents), count from a number to a number (e.g., count from 3 to 9), match a numeral to a quantity (e.g., ), match a quantity to a numeral (e.g., 2  3 ), order numerals (e.g., 2 3 4 6 5 1 → 1 2 3 4 5 6 ), order quantities (e.g.,  ), which numbers are more and less then other numbers and which numbers come before and after other numbers.

Addition: In the addition component of the skill sequence students learn to join 2 sets of objects to make a third set of objects with more members then either of the 2 sets joined. Joining sets was also taught in Objective 8 of the sets component of the skills sequence. As delineated above concrete addition is taught in the one-to-one correspondence component. The addition component of the sequence elaborates on the skills taught in Objective 8 of sets and one-to-one correspondence through teaching students to use the skills of rational counting, rote counting, matching numerals to quantities, matching quantities to numerals, more, less, equivalence, and ordering numerals to more efficiently solve addition problems.

## III. Scope and Sequence

Listed below are the major components of the math skills sequence and their prerequisites. The chart which follows the listing of each major component and its prerequisite is a depiction of this listing (the program scope and sequence) in a chart format.

A. Prerequisites
  1. Imitation
  2. Functional Object Use

B. Sets
    a. Motor imitation

C. One-Many
    a. Sorting objects which differ along at least one dimension (B. Sets, Objective 2)

D. One-to-One Correspondence
    a. Sorting objects which differ along at least one dimension (B. Sets, Objective 2)

E. Equivalence
    a. Discriminating one from many (C. One-Many, Objective 1)
    b. Arranging objects in a configuration which manifests one-to-one correspondence (D. One-to-One Correspondence, Objective 1)

F. More and Less
  1. More
    a. Discriminating one from many (C. One-Many, Objective 1)
    b. Arranging objects in a configuration which manifests one-to-one correspondence (D. One-to-One Correspondence, Objective 1)
    c. Rational count to ten (G. Counting, 1. Rational, Objective 3)
    d. Discriminate equivalence (E. Equivalence, Objective 2)
  2. Less
    a. Discriminate more (F. More and Less, 1. More)
  3. More/Less
    a. Discriminate more and less (F. More and Less, 1. More and 2. Less)
  4. Conservation of Number
    a. Discriminate more from less (F. More and Less, 3. More/Less)

G. Counting Forward
  1. Rational
    a. Verbal imitation and/or signing
    b. Sorting objects which vary along at least one dimension (B. Sets, Objective 2)

2. Rote
    a. Rational count to ten (G. Counting, 1. Rational, Objective 3)
3. Numeral Recognition
    a. Rational count to ten (G. Counting, 1. Rational, Objective 3)
4. Matching Numerals to Quantities
    a. Rational count to ten (G. Counting, 1. Rational, Objective 3)
    b. Discriminate numerals one through ten (G. Counting, 3. Numeral Recognition, Objective 1)
5. Matching Quantities to Numerals
    a. Rational count to ten (G. Counting, 1. Rational, Objective 3)
    b. Discriminate numerals one through ten (G. Counting, 3. Numeral Recognition, Objective 1)
6. Ordering Numerals
    a. Rational count to ten (G. Counting, 1. Rational, Objective 3)
    b. Rote count to ten (G. Counting, 2. Rote, Objective 2)
    c. Discriminate numerals one through ten (G. Counting, 3. Numeral Recognition, Objective 1)
7. Ordering Quantities
    a. Discriminate more from less (F. More and Less)
    b. Order numerals from one to ten (G. Counting, 6. Ordering Numerals)

H. Addition
1. Addition With Objects ( $\boxed{\cdot} + \boxed{\cdot\cdot} = \boxed{\cdot\cdot\cdot}$ )
    a. Join sets of unlike objects (B. Sets, Objective 8)
    b. Rational count to ten (G. Counting, 1. Rational, Objective 3)
    c. Equivalence (E. Equivalence, Objective 2)
2. Numerals and Objects ( $\underset{1}{\boxed{\cdot}} + \underset{2}{\boxed{\cdot\cdot}} = \underset{3}{\boxed{\cdot\cdot\cdot}}$ )
    a. Discriminate numerals one through ten (G. Counting, 3. Numeral Recognition, Objective 1)
    b. Match numerals one through ten to a quantity (G. Counting, 4. Matching Numerals to Quantities, Objective 1)
    c. Match quantities one to ten to a numeral (G. Counting, 5. Matching Numerals to Quantities, Objective 1)
    d. Join sets of objects and tell how many (H. Addition, 1. Objects)
3. Numerals and Lines ( $\underset{1}{\boxed{/}} + \underset{2}{\boxed{//}} = \underset{3}{\boxed{///}}$ )
    a. Ability to draw lines
    b. Add objects using numerals to denote the number (H. Addition, 2. Numerals and Objects, Objective 1)
4. Numerals ( $\underset{/}{1} + \underset{//}{2} = \underset{///}{3}$ )
    a. Add using numerals and lines to denote number (H. Addition, 3. Numerals and Lines, Objective 1)
5. Fingers (2 + 2 = __ and 2 + __ = 4)
    a. Rote count from a number to a number from one to ten (G. Counting, 2. Rote, Objective 3)
6. Facts

    a. Rote count from a number to a number from one to ten (G. Counting, 2. Rote, Objective 3)
    b. Add using numerals and lines (H. Addition, 4. Numerals, Objective 1) and/or Add using fingers (H. Addition, 5. Fingers, Objective 1)

I. Story Problems
  1. One-to-One Correspondence
    a. Motor imitation
    b. Sorting objects which differ along at least one dimension (B. Sets, Objective 2)
    c. Rational count to five (G. Counting, 1. Rational, Objective 2)
  2. X + Y = __
    a. Add using numerals and lines (H. Addition, 4. Numerals, Objective 1) and/or Add using fingers (H. Addition, 5. Fingers, Objective 2)
  3. X + __ = Y
    a. Add using fingers (H. Addition, 5. Fingers, Objective 4)

## Scope and Sequence Chart

| | Objectives | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. Prerequisites | | | | | | | | | | | | | | | | | | | | |
| 1. Imitation | 1 | | | | | | | | | | | | | | | | | | | |
| 2. Functional Object Use | 1 | | | | | | | | | | | | | | | | | | | |
| B. Sets | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | | | | | | | | |
| C. One-Many | | | | 1 | 2 | 3 | | | | | | | | | | | | | | |
| D. One-to-One Correspondence | | | | 1 | | | | | | | | | | | | | | | | |
| E. Equivalence | | | | | 1 | 2 | | | | | | | | | | | | | | |
| F. More and Less | | | | | | | | | | | | | | | | | | | | |
| 1. More | | | | | | | | | 1 | | | | | | | | | | | |
| 2. Less | | | | | | | | | | 1 | 2 | | | | | | | | | |
| 3. More/Less | | | | | | | | | | | | 1 | 2 | | | | | | | |
| 4. Conservation of Number | | | | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| G. Counting Forward | | | | | | | | | | | | | | | | | | | | |
| 1. Rational | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | | | | | |
| 2. Rote | | | | | | | | | 1 | 2 | 3 | | | | | | | | | |
| 3. Numeral Recognition | | | | | | | | | 1 | | | | | | | | | | | |
| 4. Matching Numerals to Quantities | | | | | | | | | | 1 | | | | | | | | | | |
| 5. Matching Quantities to Numerals | | | | | | | | | | 1 | | | | | | | | | | |
| 6. Ordering Numerals | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 7. Ordering Quantities | | | | | | | | | | | | | | | | | | | | 1 |
| H. Addition (Equation) | | | | | | | | | | | | | | | | | | | | |
| 1. Objects | | | | | | | | | | 1 | 2 | | | | | | | | | |
| 2. Numerals and Objects | | | | | | | | | | | | 1 | | | | | | | | |
| 3. Numerals and Lines | | | | | | | | | | | | | 1 | | | | | | | |
| 4. Numerals | | | | | | | | | | | | | | 1 | | | | | | |
| 5. Fingers | | | | | | | | | | | | | | | 1 | 2 | 3 | 4 | | |
| 6. Facts | | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | | | |
| I. Story Problems | | | | | | | | | | | | | | | | | | | | |
| 1. One-to-One Correspondence | | | | | | | | 1 | | | | | | | | | | | | |
| 2. X + Y = | | | | | | | | | | | | | | | 1 | | | | | |
| 3. X + __ = Y | | | | | | | | | | | | | | | | | | 1 | | |

All the skills taught in the sequence are listed vertically (functional object use, imitation, sets, etc.). The objectives for each skill are listed horizontally. As can be discerned from the chart, the objectives of various skills may often be taught concurrently. For instance, a student could be learning objectives 3, 4, 5 of sets concurrently with objectives 1, 2, 3 of one-many.

## IV. Adapting the Math Skills Sequence

A skill sequence is a task analysis and involves the precise delineation of the skills to be taught broken into their component parts and sequenced from simple to complex. According to Resnick, Wang and Kaplan (1974) task analysis involves:

> (the) develop(ment of) hierarchies of learning objectives such that mastery of objectives lower in the hierarchy (simpler tasks) facilitates learning of higher objectives (more complex tasks) .... This involves a process of task analysis in which specific behavioral components are identified and prerequisites for each of these determined. (p. 680)

A skills sequence or task analysis of a curriculum area is delineated to provide an organized set of learning objectives around which instructional programs of many types may be organized. A skills sequence is not a statement of how a task is to be taught or assessed but rather a prerequisite to the delineation of specific instructional and measurement procedures.

The underlying assumption of a skill sequence is that most students learn skills in the same order. However, a skills sequence should be adapted to individual student needs (e.g., motor handicaps, blindness, deafness, muteness). In adapting a skill sequence to individual students the basic presentation order of skills may be constant across students. However, when needed, the sequence may be modified or broken into smaller steps. A skills sequence may be adapted to individual students through: a) adapting instructional procedures; b) adapting tasks and materials; and c) adapting response requirements.

### A. Adapting Instructional Procedures

Many instructional procedures may be used to teach the same skill (e.g., play activities, highly structured drills, group instruction, individual instruction, combinations of group and individual instruction), and procedures which are most effective with students of concern should be used. However, whatever instructional procedures are used the teacher can use the skill sequence to monitor student progress.

After delineating how to adapt the tasks and responses to be used in the math skills sequence, a basic instructional procedure we have found to be relatively successful with severely handicapped students is articulated and its adaption to the sequence illustrated.

## B. Adapting Tasks and Materials

A skill may be taught through many tasks and materials. The tasks and materials selected to teach a skill should be chosen on the basis of their: a) functional use to the individual student; b) accessability or frequency of occurrence across the environment of the individual student; c) reinforcement value to the individual student; d) facilitation of discrimination learning; e) applicability to repeated practice during skill acquisition; f) facilitation of later skill development; and g) facilitation of skill maintenance.

Selecting tasks on the basis of functional use involves selecting tasks students can potentially use outside a controlled instructional setting. For example, the operation of sorting (concept of sets) can be taught through teaching students to sort circles and squares into separate sets in the classroom, pennies and nickels into separate sets in the classroom, glasses and silverware into separate sets while the students are doing the dishes, and food and nonfood items into sets while the students are preparing a snack. In the above example, sorting dishes and food items are a more functional tasks to utilize when teaching sorting than sorting circles and squares.

Choosing tasks based upon the criterion of accessability or frequency of occurrence involves teaching students skills through tasks which they may encounter in environments they frequently inhabit. For instance, setting the table is a functional task through which the operation of one-to-one correspondence may be taught. However, for students who live in an environment in which they are not and probably will not be required to set the table, the task is relatively inappropriate.

Choosing tasks on the basis of their reinforcement value to individual students involves selecting materials students readily interact with, preferably in a free play situation (a situation where the material is available but the student is not prompted to interact with it or externally reinforced for interactions). Reinforcing materials may be structured into reinforcing tasks; that is, tasks that are fun for both the student and teacher. In many instances this will involve teaching skills through toys, games, music and songs. For instance, math facts may be taught through dull flashcard drills or through a math fact game (e.g., races in which students compete to answer math fact problems faster than other students or the teacher). Some potential instructional advantages of using tasks with reinforcement value to students are: 1) correct responses may be reinforced by allowing students to continue to perform the task and/or to interact with the task materials instead of relying on external reinforcers such as M & Ms; and 2) students are more likely to interact with the task materials and perform the skills taught through them outside of the instructional situation.

The criteria that tasks be chosen on the basis of their functionality, frequency of occurrence, and reinforcement value to the students presents a major problem in programming for many severely handicapped students. That is, many severely handicapped students live in environments, such as institutions, where they are not expected to or required to perform functional tasks. Also, for many severely handicapped students there appear to be few appropriate materials or tasks which have reinforcement value to them.

Some criteria for selecting potentially reinforcing tasks are: a) tasks should be novel or offer results that are not always predictable; b) tasks should be matched to students' functioning levels. Tasks which are either too easy or too sophisticated are not appropriate. However, tasks just above current functioning level should hold interest and pace development; and c) tasks should allow active engagement and manifest cause and effect relationships.

Selecting tasks on the basis of facilitation of discrimination learning involves teaching skills through tasks or events to which students can readily differentially respond. For instance, one-to-one correspondence could be taught through teaching students to align forks and spoons in an arrangement which manifests one-to-one correspondence. Obviously, students who could differentially respond to forks and spoons (e.g., sort them) at the initiation of instruction would learn to perform the one-to-one correspondence operation through this task more readily then students who could not initially differentiate between them. Before selecting tasks to teach skills or concepts, the discriminations which must be taught should be identified. For instance, if an objective is to teach numeral recognition, then the basic discriminations to be taught are numeral forms (e.g., 2, 3). Tasks which facilitate discrimination learning should be selected and devised. The fundamental discrimination learning rule when selecting tasks to teach a concept is to choose tasks which will insure that the students' responding is controlled only by the essential characteristics of the concept. For instance, in teaching numeral recognition, tasks should be selected which will insure that the students' responding is controlled by the form of the numerals and not their size, color, texture or spatial position. Becker, Engelmann and Thomas (1971) suggest that to insure that the essential characteristics control the students' responding instructional tasks should be chosen which allow the teacher to:

a. Teach the concept through a set of instances and not instances of the concept (e.g., instances of the numeral 2 and not instances of the numeral 2).

b. Construct instances of the concept such that they all have essential concept characteristics and construct not instances such that they have none or some of the essential characteristics.

c. Frequently vary the nonessential characteristics of the instances and not instances to insure that the students learn to respond only to essential characteristics (e.g., in teaching the numeral 2 the size, color, texture and position of instances and not instances of the numeral should be varied).

Functional and frequently occurring tasks often do not meet the optimum discrimination learning requirements specified above necessitating that skills be taught through a combination of functional and relatively nonfunctional tasks.

Selecting tasks that have continued applicability to repeated practice during skill acquisition involves choosing tasks through which the student can be presented many opportunities to respond. This selection criterion is based on the notion that frequent opportunities to respond typically results in more efficient learning then less frequent opportunities. One problem with many of the more functional tasks is that they do not permit the student to respond frequently. For instance passing out cookies at juice time is a relatively functional task for teaching one-to-one correspondence, but it typically permits only one response opportunity for one student per day. Thus, in most instances it will be necessary to teach a skill through both functional tasks that permit few response opportunities and several relatively nonfunctional tasks (e.g., giving each bear a block) that permit numerous response opportunities.

Choosing tasks on the basis of their facilitation of later skill development involves teaching of tasks that will become a component of a higher level skill in more advanced stages of the sequence. For instance, teaching students to count their fingers may not have great utility at the time rational counting is taught but it will have during the teaching of addition.

Selecting tasks which facilitate the maintenance of math skills involves utilizing tasks which will enhance the probability that students will retain and utilize the math skills after initial acquisition. Generally, maintenance of skills can be insured through students' repeated practice or use of the skills. Teaching skills through functional tasks which frequently occur in the environments the students inhabit should enhance skill maintenance. Skill maintenance may also be enhanced through devising games which require that students utilize particular skills and in making these games a regular component of their academic program and free time activities. Some of the game formats we use include: races between individuals or teams of students which require the students to utilize math skills (e.g., the students race to label numerals and the teacher tallies the score Student 1 | //// Student 2 | // ); board games, similar to "Chutes and Ladders," which require use of math skills (e.g., | start | 2 or ⚀⚁ | 5 | count to 5 | etc. | finish |. The students compete to win a board game and may have to spin a spinner, turn over a number card, or shake dice and rationally count the correct number of squares. Then, to stay on a square a student must perform a math skill represented on the square, such as sort objects into sets; and grab bag, which involves the students drawing an object or card from a bag and in order to keep the object or card the student must perform a skill related to it (e.g., label an object, label a numeral, count to five). The teacher may arrange the games such that the same individuals or teams do not consistently win or lose. It is sometimes advantageous to set up the games so that the students are competing with the teacher and/or their previous best score.

It is unlikely that one task which fulfills all the criteria delineated above may be devised. Thus, in teaching a skill it will often be necessary to teach it through many tasks which when combined fulfill the criteria. Use of these three basic tasks should fulfill the task selection criterion: a) functional tasks; b) games; and c) repeated practice tasks.

a. Functional tasks: As articulated above, selecting tasks on the basis of functional use involves teaching skills through functional tasks students frequently encounter. For example, the operation of sorting glasses and silverware can be taught through teaching students to sort glasses and silverware into separate sets at a worktable in the classroom or sorting glasses and silverware into separate sets while putting away the dishes after lunch.

b. Games: Tasks which facilitate the maintenance and generalization of skills should be selected. Skill maintenance can be insured through students' repeated use of skills. Teaching skills through tasks which frequently occur in environments the students inhabit should enhance skill maintenance. Skill maintenance may also be enhanced through devising games or fun activities (e.g., songs, play) which require that students use particular skills and making these games and fun activities a regular component of students' daily programs and free time activities. In addition, games and fun activities have potential reinforcement value to students, and thus students are more likely to play the game and use the skills outside of the instructional setting.

c. Repeated Practice Tasks: A problem with some functional tasks and games is that they only provide infrequent response opportunities (practice) or do not facilitate discrimination learning. Selecting tasks with continued applicability to repeated practice and which facilitate discrimination learning involves choosing tasks which may be presented under controlled conditions and through which the student can be presented many opportunities to respond. In some cases repeated practice tasks may have to be used in conjunction with functional tasks and games.

## C. Adapting Responses

Through a task students may learn at least concepts and operations. That is, in teaching a task students may learn to discriminate one ball from non-balls or to discriminate many balls differing along dimensions of size, color, and composition (the concept balls) from non-balls. Operations are concepts which are general response classes or general procedures (e.g., touching, placing, labeling) the student may use to demonstrate knowledge of skills. Concepts which are taught early in the sequence may be used as operations in the acquisition of later skills. For example, in the math sequence, one-to-one correspondence is taught as a concept which the student later uses as an operation to solve equivalence problems.

It should be noted that tasks are taught not concepts or operations. It is inferred that students know concepts and operations on the basis of their performance over a number of tasks. For instance, through tasks students could be taught to differentially respond to balls. After students differentially respond across a range of balls using a variety of operations, it is inferred that the students have learned a concept of ball. Similarly, after students have been taught to "touch" across a number of tasks requiring them to touch different items it is inferred that the students know the operation "touch."

Most skill sequences or curricula require students to use verbal operations (e.g., speech) to demonstrate knowledge of tasks and are therefore inappropriate for nonverbal and many severely handicapped students. What is delineated here is a sequence of math skills through rudimentary addition which may be adapted to either verbal or nonverbal students. Both nonverbal and verbal operations students can use to demonstrate knowledge of the skills are provided.

The nonverbal and verbal operations delineated for each skill in the sequence are only meant to be illustrative. There are at least two criteria that may be used in selecting verbal and nonverbal operations. One, select nonverbal operations which allow the student to interact with the task (e.g., take, show me). Two, select only operations which are appropriate to the individual student's level of language production. That is, nonverbal students should be expected to use nonverbal operations (e.g., touching, signing). Likewise, students who use one word utterances should be expected to respond with one word utterances and students who use four word utterances should be expected to respond with four word utterances. In short, a skill sequence can be adapted to students with specific motor and expressive language problems through allowing students to learn and demonstrate skill mastery through responses they are capable of performing. Whenever possible, students should be taught to use a variety of appropriate verbal and nonverbal operations to demonstrate knowledge of the same skill.

### D. Facilitating Performance of Skills Across Environments in Which They Are Functional

The success of a program should be assessed on at least two criteria: one, student acquisition of new skills; and two, student performance of skills across environmental configurations.[4]

Typically, it is the aim of instructional programs for students to appropriately perform skills acquired in one teaching environment in other environments where these skills are functional. However, neither systematic programming nor accurate measurement of skill performance across environments usually occurs. For instance, a program may teach a student the one-to-one correspondence operation (skill) through nonfunctional tasks (e.g., aligning blocks and bears in one-to-one correspondence) and then suggest that the teacher take advantage of every opportunity to require students to use the skill across functional tasks and environments (e.g., having the students use the one-to-one correspondence operation to give each of his classmates a cup of juice at snack time).

However, if the success of a program is to be assessed in terms of a student's performance of skills across environmental configurations, then the objective for each major skill taught in a program should include a student's performance of skills across selected environmental configurations. For example, the instructional objective for the one-to-one correspondence skill might be: Given the response cues "Give each _____ a _____" or "Give every _____ a _____" by at least three different control figures (e.g., teacher, mother, peer) across at least three settings (e.g., classroom, playground, home) and across at least three functional tasks (e.g., setting the table, passing out cookies, musical chairs) the student should appropriately demonstrate use of the one-to-one correspondence operation.

Potentially, there are many instructional strategies which could be employed to insure that students master the objective. Some selected strategies are:

1. Instruct the students on several functional tasks in one teaching environment with one teacher and test and then if necessary, teach the student to perform the skill across varied cues to respond, functional tasks, control figures and settings.
2. Instruct the student on several nonfunctional tasks in one teaching environment with one control figure

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[4] As used here environmental configurations include cues to respond, physical settings, control figures and functional tasks.

and take advantage of every opportunity to require the student to use the skill on functional tasks across settings, control figures, and cues to respond. Then test and if necessary, teach the student to perform the skill across functional tasks, control figures, settings and cues to respond.

3. Instruct the student on several functional and nonfunctional tasks across several settings, control figures, and cues to respond. Then test to assess if the student can perform the skill on untaught tasks with new control figures in new settings.

The third option may be the most viable. If students are to perform the skills across functional tasks, then teach the skill through a combination of functional tasks and repeated practice tasks which fulfill the task selection requirements previously delineated. For instance, teach the students one-to-one correspondence through such tasks as passing out juice cups and giving each bear a block. If the students are to perform the skills across settings, then it may be advantageous to teach the skills in several settings. For instance, teaching might occur in the gym, on the playground, in the hall, in the bathroom, and in a kitchen area using tasks appropriate to those areas. If it is necessary that students perform skills under the direction of several control figures, then several control figures may be used in instruction. If the students are likely to encounter varied cues to respond, then instruction should include cues to respond which frequently occur. For instance, students might be taught to use the one-to-one correspondence operation in response to the following cues: "Give every (_____) a (_____)," "Give each (_____) a (_____)," "Give one (_____) to each (_____)," "Put the (_____) in each (_____)," etc.

Many educational programs are evaluated in terms of how quickly they advance students vertically from "lower" level skills to "higher" level skills (e.g., from one-to-one correspondence, to equivalence, to addition). However, the effectiveness of a program should be evaluated in terms of whether it teaches students skills and if they can perform the skills across functional tasks, control figures, cues to respond and settings. This emphasis requires that both rate of skill acquisition and utility of the skill be assessed in determining the efficacy of a program.

## E. Summary

A basic task analysis or skill sequence of math skills ranging from zero skills through rudimentary addition will be articulated. The skill sequence may be adapted to specific students and situations through:

1. Teaching the skills through instructional procedures which are the most effective for individual students.

2. Choosing the tasks and materials to teach skills on the basis of their functional use to individual students, accessability or frequency of occurrence across settings individual students inhabit, reinforcement value to individual students, facilitation of discrimination learning, facilitation of repeated practice, enhancement of later skill development, and facilitation of skill maintenance.

3. Requiring students to use operations (e.g., touching, signing, speech) which are appropriate to their level of language functioning.

In implementing the sequence to facilitate the performance of skills across environments in which they are functional the skills should be taught:

1. through tasks and materials the student readily interacts with, preferably in a free play situation;
2. through a wide range of functional tasks;
3. across a number of control figures;
4. across a number of environmental settings;
5. across a number of frequently occurring cues to respond.

## V. Procedures

A basic instructional and measurement procedure we have found to be relatively successful with severely handicapped students is articulated below. Following a description of this basic procedure selected variants which may make it more effective for specific students and situations are delineated.

In the basic instructional procedure the teaching and measurement procedures are incorporated into test-teach designs. That is, the teacher presents a cue; if students respond correctly, they are rewarded; if they respond incorrectly, they are taught the correct response through either a modeling procedure (the teacher models the response and requires the student to imitate it) or a priming procedure (the teacher physically guides the student through the correct response). For students who initially error, the modeling cues and prompts are faded until the correct response occurs in response to verbal cues (models are faded by gradually modeling less of the correct response - prompts are faded by gradually withdrawing physical support until the student performs the response without teacher assistance).

## A. Acquisition and Proficiency Criterion

Acquisition criterion levels may be set in terms of trials. That is, when teaching numeral recognition one could teach the numerals in sets of one, two, three, etc. dependent upon the abilities of the student. The responses a student makes to a complete set is considered a trial: e.g., for a set of one, one response equals a trial, for a set of two, two responses equals a trial, etc. A commonly employed acquisition criterion is three consecutive correct trials. A sample data sheet should further clarify the notions of trials and criterion.

Sample Data Sheet*

Date ________ Behavior Objective Num. Rec. Set 1, 2, 3

| Name | Trial | Num. 1 | Num. 2 | Num. 3 | Tot. Correct |
|---|---|---|---|---|---|
| Student #1 | 1 | P | P | M | 0 |
| | 2 | + | + | + | 3 |
| | 3 | + | M | + | 2 |
| | 4 | + | + | + | 3 |
| | 5 | + | + | + | 3 ** |
| | 6 | + | + | + | 3 |

*In the data system utilized: + = a correct response, M = a correct response after a model, and P = a correct response after a prime.

**Criterion met three consecutive correct trials.

If students have acquired a skill and performed it correctly on three consecutive trials, it does not indicate that they can proficiently use the skill. As used here, proficiency means that the students can correctly perform a skill and perform it correctly at a selected rate criterion. For instance, students should be able to correctly rationally count objects and count them quickly before they can be considered to be proficient at rational counting.

There are at least two reasons for setting proficiency criterion in terms of rates of correct responding. One, if the students are to be tolerated by and compete with other individuals in the community they will have to perform skills quickly and correctly. For example, slow but correct coin counters cannot readily compete for many clerk jobs. Two, if skill 'A' is necessary for acquisition and performance of skill 'B', then a slow rate of performance on skill 'A' may impede the acquisition and performance on skill 'B.' This concept may be illustrated through several examples. For instance, let's say a teacher's objective is to teach students to imitate motoric gestures such as patting knees and clapping hands. If the students do not have proficient eye-hand coordination on motor patterns similar to those they are to imitate, then the students will have trouble getting their hands to go where they should, impeding their ability to imitate a model. However, if students have mastered eye-hand coordination on motor patterns similar to those they are to imitate, then they should be ready to learn the task of imitating the model's gestures. Thus, as Bruner (1973) points out, preliminary motor skill proficiency provides the basis for utilizing modeling and for carrying out imitation. Similarly, in the math skill sequence, rational counting is one of the component (prerequisite) skills involved in addition. Rapid and correct rational counting should facilitate the acquisition of addition tasks. Since developmental skills sequences are cummulative (new skills involve previously acquired skills) students should be approaching proficiency at the component (prerequisite) skills of an unfamiliar task before being presented instruction on the task.[5] Once students have acquired a skill they may attain proficiency through additional practice of the skill which requires correct and rapid responding. Games and races similar to those described in an earlier section (Adapting Tasks) are excellent vehicles for giving students additional practice on a skill.

## B. Basic Instructional and Measurement Procedure

1. Secure the attention of the student(s) to the teacher or the task.
2. Present materials.
3. Present a cue for the student(s) to attend to the instructional materials.
4. Present a cue for the student(s) to respond.
5. Evaluate student's response.
   a. Correct response: Immediately consequate the student's response with verbal praise (e.g., the teacher says, "Good," and describes why it was good - "Good, there are enough" or "Good, they are the same"), a smile and if necessary some tangible consequence (food, toy, token). Record the correct response on a data sheet and begin the next trial, go to the next student, etc. If the student performs correctly in three consecutive trials, place an emphasis on the rate of correct responding.

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[5] Skill proficiency levels may be estimated by calculating adult rates of correct performance of a skill and then dividing this rate by two. Obviously, special adjustments in proficiency rates have to be made to accommodate individuals with motoric impairments.

  b. Incorrect response: Say "No" and tell the student why it was wrong (e.g., "No, not enough" or "No, not the same"), then go to Step six.

6. Secure the attention of the student and provide a model of the correct response. Then present a cue to respond.

7. Evaluate the student's response.
   a. Correct response: Immediately consequate the student's response with verbal praise (e.g., the teacher says, "Good," and describes why the response was good - "Good, there are enough" or "Good, they are the same"), a smile and if necessary some tangible consequence. Record that the response was performed correctly after a model was provided (M) and on subsequent trials gradually fade out the model.
   b. Incorrect response: Say "No" and tell why it was wrong (e.g., "No, not enough" or "No, not the same"), then proceed to Step eight.

8. Secure the attention of the student, present the cue to respond and prime the correct response by physically guiding the student in its performance. Consequate the response with verbal praise and describe why it was correct (e.g., "Good, there are enough"), smile and if necessary provide some tangible consequence. Record that the response was primed (P) and on subsequent trials fade out the prime.

9. Follow the procedures until the student performs correctly in three consecutive trials.

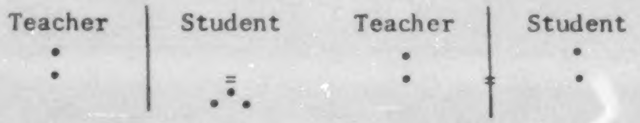
## C. Adapting the Instructional Procedure to Behavioral Objectives

The basic procedures presented above may be adapted to each behavioral objective. An illustration of an adaption to a selected objective is described below.

### 1. Adaptation to an Equivalence Objective:

### Behavioral Objective 1 - Instructional Sequence Step b:

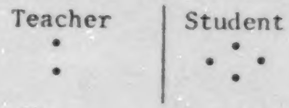
When the teacher places a selected number of items (from 1 to 10) in a set and says, "Make your set equal to my set," the student should use the operation of one-to-one correspondence to make his/her set equal and then place an equals sign between the two sets, (i.e., the student should match members of his/her set with the teacher's until there are no unmatched members).



Adaptation of Teaching Method:

1. The teacher says, "Look" and secures the attention of the students to the task.

2. The teacher puts a set of items in his/her set in a vertical array.



3. The teacher selects one student and says, "Joe, look at this," while he/she points to the materials.

4. The teacher says, "Make your set equal to my set."

5. The teacher evaluates the student's response.
   a. Correct response: If the student utilizes the operation of one-to-one correspondence to put the same number of objects on his/her half of the sheet and places an equal sign between the sets, he is immediately consequated with verbal praise (e.g., "Good, there are enough" or "equal"), a smile and if necessary a consumable. The data sheet is marked with a "+." If the student has three consecutive correct trials, place an emphasis on the rate of correct responding.
   b. Incorrect response: If the student does not utilize the operation of one-to-one correspondence and/or puts out the wrong number of items, the teacher says, "No, not equal," "too many" or "not enough" and goes to Step six.

6. The teacher secures student attention and models the correct response (including the one-to-one correspondence operation) and then presents the cue to respond (See Step four).

7. The teacher evaluates the student's response.
   a. Correct response: If the student uses the operation of one-to-one correspondence to place the same number of objects in his set and places an equal sign between the sets, he is immediately consequated with verbal praise (e.g., "Good, there are enough" or "equal") and a smile and the teacher marks an "M" on the data sheet.
   b. Incorrect response: If the student does not use the operation of one-to-one correspondence and/or puts out the wrong number of items, the teacher says, "No, not equal," "too many" or "not enough" and goes to Step eight.

8. The teacher secures the student's attention, presents the response cue and primes the correct response by physically

guiding the student through it. The teacher consequates a correct response with verbal praise (e.g., "Good, there are enough" or "equal") and a smile and marks the data sheet with a "P."

9. Follow these procedures until the student performs correctly in three consecutive trials.

Sample Data Sheet

Date ____________ Behavior Objective Equivalence 1 Array Vertical

| Name | Trial | Task 1 | Task 2 | Task 3 | Tot. Correct |
|---|---|---|---|---|---|
| Student #1 | 1 | + | M | + | 2 |
| | 2 | + | P | M | 1 |
| | 3 | + | M | + | 2 |
| | 4 | + | + | + | 3 |
| | 5 | + | + | + | 3 |
| | 6 | + | + | + | 3 |

## D. Variants on the Basic Instructional Procedures

Potentially there are a great number of variations that can be made on the basic instructional procedure illustrated. Only a few selected variants will be discussed. The introductory sections on adapting the skills sequence to individual students through adapting the tasks (materials), adapting cues to respond and facilitating performance across environments illustrated many of the basic variants on the instructional procedure. Briefly, these variants included:

1. Varying the task and task materials.
2. Presenting the task in fun format such as through a game, a race, toys, a song, etc.
3. Varying the cues to respond and responses the students are expected to emit (e.g., motor responses, verbal responses, motor and verbal responses, written responses).
4. Vary the control figure and/or setting.

Some other variants which may enhance student interest (attention) or performance on almost any task are:

1. Varying the intensity (loudness) of task presentation such that the students at times have to strain to hear and at

other times are mildly startled by the loudness of a response cue.

2. Varying the responses expected of the students over a range of responses they have mastered or are learning such that the students have to closely listen and watch to emit correct responses (e.g., "Give me more," "Touch more," "Is this more?"). This can be a game where the teacher says, "Listen carefully, I'll try to fool you," and then varies the response requirement slightly. Typically, it becomes quite difficult to fool the students.

3. Vary the intensity of the response expected from the students from whispers to shouts. As in two, this can be made into a game.

4. Varying the pace of task presentation from fast to slow such that the students must closely attend to determine when cues to respond and potential reinforcers are going to be delivered. As in two, this can be made into a "I bet I can fool or trick you" game.

5. Vary calling on the group to respond (e.g., "Everyone is this more?") and a calling on individuals (e.g., "Tom is this more?") such that students must attend closely in order not to miss their turns. This too can be made into a game.

   Many skills can be taught and practiced through group response procedures with the teacher systematically calling on individual students to assess if they can perform the skills without assistance. Through such procedures students learn to imitate the teacher and other students to learn skills.

6. Utilize procedures which reduce error responding. Once some students have learned to associate a wrong response to a response cue it is often difficult to teach them to associate a correct response with that response cue. Thus, it is often advantageous to prevent error responses from occurring. There are several variants on group and individual responding procedure that may be employed to attempt to prevent errors: One is a rehearsal procedure and the other a modeling procedure.

   In the rehearsal procedure the teacher calls upon the group or an individual to respond and then makes the response along with them. Then the teacher gradually fades out her demonstration until the group or individual can make the response without teacher assistance.

   In the modeling procedure the teacher models the entire response chain (cue and response) before calling on the

> group or an individual to respond and then uses the rehearsal procedure. Next, the teacher fades out the model when the students can respond to the rehearsal procedure alone. Finally, the rehearsal procedure is faded out.
>
> Across all procedures if at any point students start to initiate an error response, they should be stopped and the correct response should be immediately demonstrated through either the modeling or rehearsal procedure.

The effectiveness of these variants and combinations of these variants on the basic instructional procedure is generally dependent upon the characteristics of individual students. We recommend systematically experimenting with various formats to determine which formats individual students enjoy and learn from most effectively.

The following paragraphs delineate several potentially viable instructional models.

## Initial Instruction:

An instructional program should teach students to perform functional skills across tasks, materials, verbal language cues, people and settings that the students will frequently encounter. However, one could conjecture that teaching a student to perform a skill across several language cues, people, settings, tasks, and materials concurrently might impede the student's acquisition of a skill. Thus, initially it may be efficient to concentrate on instructing students on one task given one verbal language cue in one setting with one teacher. However, take advantage of every opportunity to require the students to use the skill across functional tasks, settings, people, and verbal language cues to respond.

## Skill Mastery Instruction:

When students have correctly performed a skill on one task given one verbal language cue in one setting, with one teacher, concentrate on teaching students to use the skill across several functional tasks, settings, people, and verbal language cues to respond concurrently.

A skill may be taught through many tasks. The tasks selected to teach a skill should be chosen on the basis of their: a) functional use to the individual student; b) accessability or frequency of occurrence across the environment of the individual student; c) reinforcement value to the individual student; d) facilitation of discrimination; e) applicability to repeated practice during skill acquisition; f) facilitation of later skill development; and g) facilitation of skill maintenance.

As noted earlier it is unlikely that one task which fulfills all the criteria delineated above may be devised. However, three basic tasks, functional tasks, games and repeated practice tasks should meet the task selection criterion. In many instances you may be able to devise tasks applicable to repeated practice which are functional and which are games. However, in describing the model we will separate the three basic tasks.

The first step in developing an instructional model should be to describe functional tasks, games and repeated practice tasks for the skill of concern. For example, some potential sorting (sets) tasks are:

Potential Functional Tasks:

List potential functional tasks. Systematically require each student to use sorting on functional tasks several times a day. Continually look for additional functional tasks the students can use the skill on.

1. Sort food items at snack time (e.g., put the milk on the shelf and cookies on the table).

2. Sort objects when setting up or cleaning up an activity (e.g., put the puzzles on the shelf and the balls in the box; put the plates on the shelf and the spoons in the drawer; put the crayons in the box and paint in the cupboard).

3. Join (add) sets when cleaning up or setting up an activity (e.g., put the paint and the crayons on the table; put the paper and scissors on the floor).

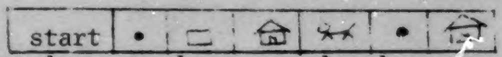
Potential Games:

List potential games. Each day during free time or during instructional time encourage students to play games involving the sorting skill. Games are excellent repeated practice and skill maintenance tasks. Continually devise new games or variations of existing games.

1. Card games similar to "Old Maid" which require the student to sort and match cards on the basis of form, size, and/or color.

2. Sorting boxes, puzzles, peg boards which require objects to be sorted on the basis of form, size, and/or color.

3. Art activities which require the student to differentially operate on items which differ along dimensions of form, size, and color (e.g., color the house red and balls blue, paste the eyes on the head and paste the hands on the arms).

4. Board games (e.g., ) which require the students to draw a card and move their marker to the next square on the board which matches the card. Verbal students could be required to label the card (e.g., red, house, spoon) before advancing on the board.

5. Grab bag which requires students to draw an object from a bag and then label it.

Potential Tasks Which Are Applicable to Repeated Practice:

1. Sort or make sets of objects (e.g., block and bears, forks and cup, straws and cups) at the classroom worktable.

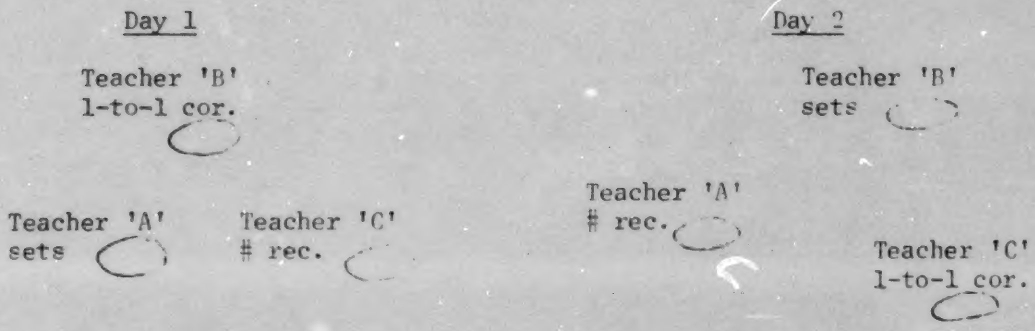
2. Sort or make sets of flannel items.

3. Sort or make sets of pictures.

For repeated practice tasks develop a procedure for systematically varying the tasks, materials, settings, instructors and language cues. A rotation procedure may be effective (Figure 1). For instance, on day one teacher 'A' teaches sets with one set of language cues and materials in setting A. Teacher 'B' teaches 1-to-1 correspondence and teacher 'C' teaches numeral recognition. On day two teacher 'B' teaches sets with a different set of language cues and materials in setting B. Teacher 'A' teaches numeral recognition and teacher 'C' teaches 1-to-1 correspondence, etc. Obviously, many variations of the rotation procedure are possible.

Figure 1

Sample Rotation Procedure



To insure students learn to perform a skill across tasks, language cues, settings and people students should be systematically required to use the skills throughout the day. The following is a sample daily routine for teaching and requiring students to use the skills of one-many and one-to-one correspondence.

Opening 8:30 - 9:00

1-to-1 Correspondence Activities:

a. Attendance: The bulletin board is divided into a present and absent section. Each student has a name card, and there should be one name card in the present section of the bulletin board for each student present. To teach one-to-one correspondence ask a student to take role (or you take role) by giving one name card to each student. If there are too many name cards, someone is absent. In this instance reading and naming classmates are being taught concurrently with one-to-one correspondence.

b. Another section of the bulletin board is devoted to a job board with pictures of the various jobs (e.g., watering plants, feeding fish). A check is placed next to each job if it has been completed. During opening students can ascertain if all jobs have been completed by determining if each job has a check. In this case home-living skills (jobs) and cooperating (everyone has a job) are being taught concurrently with one-to-one correspondence.

One-Many Activities:

a. During attendance the students can be asked if one or many students are present or absent.

b. Students may be asked to bring one or many crayons, pieces of paper, etc. to opening with them for a special activity.

Math Class 9:00 - 9:30

During math class repeated practice tasks are presented. For example:

1-to-1 Correspondence Activities:

a. Students are requested to give each flannel circle a flannel star.

b. Students are requested to give each cup a saucer.

c. Students are requested to give each paintbox a brush.

d. Students are asked to give each piece of candy a penny.

One-Many:

a. A set of one apple and a set of many apples is presented the students, and they are requested to touch, point to, take the set with one or many.

b. Pictures of sets of one comb and many combs are presented the students, and they are requested to point to the set with one or many.

c. The teacher points to a set of objects and asks students if the set has one or many objects.

Language 9:30 - 10:00

In language the students may be learning the functional use of objects (drink from cup, eat with spoon, stir with spoon, eat from bowl), to demonstrate nonverbal comprehension of object labels (presented with objects and the cue "Take a spoon," the student takes a spoon), and to label objects (asked "What is this?" or "What do you want?" students state the object name). These language skills may be taught through such tasks as tea party play. During the course of the tea party the students are requested to demonstrate functional object use, demonstrate receptive comprehension of object labels and to label objects. Students can also be requested to give each classmate a cup to demonstrate one-to-one correspondence and receptive comprehension of the label cup, go to the counter and bring back one or many spoons to demonstrate receptive knowledge of the label spoons and one-many, etc.

Snack Time 10:00 - 10:15

Snack time is a variation on the tea party activities of the language period. Students are asked: to give each classmate a napkin, to bring one or many cartons of milk from the kitchen, to state if they want one or many pieces of cookie, etc.

Recess 10:15 - 10:30

One-Many

a. Students can be asked to take one or many balls, jump ropes, etc. outside.

One-to-One Correspondence

a. Games such as musical chairs should be played.

Pre-Reading 10:30 - 11:00

1-to-1 Correspondence

a. While looking at pictures students can be asked if each person in the picture has a hat on, if every bear has feet, etc.

b. Students can be requested to give each classmate a book, worksheet, etc.

One-Many

a. Students can be requested to bring one or many pencils, crayons, pieces of paper to reading class.

b. While looking at pictures students can be asked if there are one or many dogs, cats, policemen, etc. in the picture.

The skills of one-to-one correspondence and one-many can be used throughout all other daily activities (art, lunch, gym, music, etc.). It is hoped that these limited examples illustrate that skills should not be taught in isolation but should be taught in relation to other skills (language, reading, recreation, social) if they are to be functional, maintain and generalize.

## E. Variants on the Basic Measurement Procedure:

The basic measurement procedure illustrated utilized a discrete trial format. That is, the teacher presented the student with a cue to respond, the student emitted a response, and the teacher scored the accuracy of each response. This is a direct and continuous measurement system which is extremely sensitive in that it accounts for all student responses, making it possible for the teacher to be relatively precise in determining the efficacy of an instructional procedure and in pinpointing exactly when a student reaches criterion on a selected skill. However, it is difficult, if not impossible, to continuously measure and record behavior when some of the variants illustrated above are employed as components of the instructional procedure. Alternatives to continuous measurement and recording of student behavior are pretest, post-test measures and/or periodic probes of the student's skills. Generally, the more frequent the measurement, the more accurate is the assessment of an individual student's progress within a program and the evaluation of the effectiveness of that program.

In the following paragraphs a measurement system we have found to be useful with the math skills sequence is described. More information on assessment is provided in the later section of the paper on Initial Assessment and Skill Mastery Evaluation.

It has been our experience that it is necessary for teachers to initially use the basic instructional and measurement procedure described above (Basic Instructional and Measurement Procedure). The basic procedure requires the teacher to precisely specify tasks, materials, language cues, student responses (correct and error), and teacher consequences for each student response. The use of such a highly structured instructional and measurement procedure continually provides the teacher with the relevant dimensions of the instructional task, relevant dimensions of student performance and direct and continuous measures of student skill acquisition. However, teachers may initially feel that use of the highly structured instructional and measurement procedure results in unnatural, stilted and choppy task presentations. Fortunately, with practice task presentations become natural and fluid. With sufficient practice teachers should learn to set up tasks, select materials, appropriately respond to student responses and assess student skill acquisition without referring to the basic instructional and measurement procedure. Thus, the basic instructional and measurement procedure is a training device.

Once teachers can successfully use the basic procedure they may vary the basic instructional procedure (see the suggested variations above) and employ different measurement systems. When this occurs, teachers may cease continuously recording each student response and switch to periodically recording each response. It should be noted that every time a student emits a response the teacher obtains a potentially relevant assessment of a student's skills. Periodic recorded assessments should be performed to test the validity of unrecorded assessments of student skill acquisition. We will refer to the periodic recorded assessment as probes.

We suggest that student skill acquisition should be probed at least once a week on Tuesday, Wednesday or Thursday. Mondays and Fridays are less likely to be representative of general student skill performance. The probes should follow the format of the basic instructional and measurement procedure. A later section of this paper, Initial Assessment and Skill Mastery Evaluation, describes specific measurement procedures.

The record system of the basic instructional and measurement procedure helps all individuals who are teaching a student (e.g., master teacher, student teachers, methods students, aides) keep track of where each student is in the skill sequence, and what tasks, materials and language cues are instructionally relevant for each student. If the basic instructional and measurement procedure is not used, an alternative system for keeping track of student programs should be employed. We suggest that the following system may be viable.

For each student devise a summary grid which includes all the relevant instructional objectives of the math program. A sample summary grid is depicted below. Each student's summary grid should be readily accessible in the classroom so that at any time any individual can determine what skills the student should be currently receiving instruction on and which skills the student has already mastered.

For each objective in the skill sequence the summary grid indicates instruction is in progress there should be an adjunct grid. The adjunct grid should indicate which tasks and cues the student has mastered within the objective and on which tasks and cues instruction is in progress. Probe assessment should be used to determine when students have mastered specific tasks and language cues within an objective. A sample objective grid for Equivalence is depicted below.

Student John

Summary Grid

I = Instruction in Progress
M = Skill Acquired

| | |
|---|---|
| A. Prerequisite | |
| Motor Imitation | M |
| Verbal Imitation | |
| Whole Word | I |
| Isolated Sounds | I |
| B. Functional Obj. Use | M |
| C. Sets | |
| Obj. 1 | M |
| Obj. 2 | M |
| Obj. 3 | M |
| Obj. 4 | M |
| Obj. 5 | M |
| Obj. 6 | M |
| Obj. 7 | M |
| Obj. 8 | I |
| Obj. 9 | |
| D. 1-to-1 Correspondence | |
| Obj. 1 | M |
| E. One-Many | |
| Obj. 1 | M |
| Obj. 2 | M |
| Obj. 3 | M |
| F. Equivalence | |
| Obj. 1 | I |
| Obj. 2 | |
| G. More and Less | |
| 1. More | |
| Obj. 1 | |
| 2. Less | |
| Obj. 1 | |
| Obj. 2 | |
| 3. More/Less | |
| Obj. 1 | |
| Obj. 2 | |

| | |
|---|---|
| H. Conservation of Number | |
| Obj. 1 | |
| Obj. 2 | |
| Obj. 3 | |
| Obj. 4 | |
| Obj. 5 | |
| Obj. 6 | |
| H. Counting Forward | |
| 1. Rational | |
| Obj. 1 | |
| Obj. 2 | |
| Obj. 3 | |
| Obj. 4 | |
| Obj. 5 | |
| Obj. 6 | |
| Obj. 7 | |
| 2. Rote | |
| Obj. 1 | |
| Obj. 2 | |
| Obj. 3 | |
| 3. Numeral Recognition | |
| Obj. 1 | |
| 4. Match # to Quantities | |
| Obj. 1 | |
| 5. Match Quantities to # | |
| Obj. 1 | |
| 6. Ordering Numerals | |
| Obj. 1 | |
| Obj. 2 | |
| Obj. 3 | |
| Obj. 4 | |
| Obj. 5 | |
| Obj. 6 | |
| Obj. 7 | |
| Obj. 8 | |
| Obj. 9 | |
| 7. Ordering Quantities | |
| Obj. 1 | |

| | |
|---|---|
| H. Addition | |
| 1. Objects | |
| Obj. 1 | |
| Obj. 2 | |
| 2. Numerals & Obj. | |
| Obj. 1 | |
| 3. Numerals & Lines | |
| Obj. 1 | |
| 4. Numerals | |
| Obj. 1 | |
| 5. Fingers | |
| Obj. 1 | |
| Obj. 2 | |
| Obj. 3 | |
| Obj. 4 | |
| 6. Facts | |
| Obj. 1 | |
| Obj. 2 | |
| Obj. 3 | |
| Obj. 4 | |
| Obj. 5 | |
| Obj. 6 | |
| I. Story Problems | |
| 1. 1-to-1 Correspondence | |
| Obj. 1 | |
| 2. X + Y = __ | |
| Obj. 1 | |
| 3. X + __ = Y | |
| Obj. 1 | |

Student John

## Equivalence - Objective 1

M = Skill Acquired
I = Instruction in Progress

Tasks:

Functional:

| | |
|---|---|
| Passing out cups at juice time | I |
| Giving each classmate a pencil | I |
| Giving each classmate a crayon during art | I |
| Etc. | |

Games:

| | |
|---|---|
| Musical Chairs | I |
| Etc. | |

Repeated Practice:

| | |
|---|---|
| Give each bear a block | I |
| Put a straw in each cup | I |
| Give each tree a bird | I |
| Etc. | |

Object Arrays

| | |
|---|---|
| Vertical | M |
| Horizontal | M |
| Varied | I |
| Linear | I |

Set Equivalence

| | |
|---|---|
| Enough | M |
| Not Enough | M |
| Too Many | M |

Language Cues

| | |
|---|---|
| Make your set equal | M |
| Are the sets equal | I |
| Are there enough | I |
| Are there too many | I |
| Etc. | |

## F. Placing the Student

Utilization of skill sequences and task analyses facilitates individualization of instruction. Within the task analysis model, students' mastery of various objectives can be assessed before instruction, and they may only be instructed on objectives on which they failed and for which they have mastered the prerequisites. Students can be permitted to proceed through the sequence at their own pace, taking longer on trouble spots and skipping steps on which they demonstrate mastery. The level of a student's entrance into the sequence and mastery of behavioral objectives is assessed through administering baseline tests composed of a sampling of items from selected behavioral objectives.

Typically, one baseline measure (test) is given for each selected behavioral objective and basically consists of implementing steps one through four of the basic teaching procedure. For example, the baseline measure for the equivalence behavior objective could be administered as follows:

1. The teacher says, "Look" and secures eye contact with the materials.
2. The teacher puts a set of items on his/her half of the paper in one of the specified arrays.
3. The teacher selects one student and says, "S, look at this," while he/she points to the materials and says, "Make your side equal to my side." If S looks, the teacher goes on to Step four. If S does not look, the teacher physically primes S to look and then goes on to Step four.
4. The teacher marks a "+" for a correct response and a "-" for an error response.

Obviously, it would be inefficient to test the students on every behavioral objective of the math skill sequence before beginning instruction. Typically, students are only tested on skills for which they have demonstrated the requisite behaviors. For instance, a student who did not demonstrate mastery of rational counting or equivalence and matching quantities to numerals would not be tested on an addition objective. Similarly, students are not initially tested on every objective of a math skill. They may be initially tested on the highest numbered objectives and only if they fail these objectives would they be tested on lower numbered objectives. For example, in testing knowledge of "sets" the students might initially be tested on objective 9 and only if they failed objective 9 would they be tested on objective 8, 7, 6, 5, etc. If there are a potentially large number of objectives to be tested, the teacher may systematically test various objectives (e.g., 8, then 3, then 5, then 6) until the appropriate instructional objective is determined.

In evaluating the student's entry level, a checklist or grid may be devised which will reflect baseline test results. Below are grids on which several possible testing outcomes are depicted. A later section, Procedures for Initial Assessment and Skill Mastery Evaluation, delineates more specific measurement and initial placement procedures.

## VI. Prerequisites

There are two prerequisites students should meet before being programmed through the math skills sequence: One, the students should be imitative, and two, the students should readily interact with the objects and task materials they will encounter during instruction of the math skills sequence.

### A. Imitation

Prompting and modeling are two general instructional procedures which may be utilized to teach most tasks. Prompting is a procedure which involves physically guiding students through a response or response sequence. For instance, to teach students a one-to-one correspondence operation the students could be physically guided through the chain of responses required to align sets in a configuration manifesting one-to-one correspondence. The prompts could then be eliminated by gradually withdrawing the physical guidance until the students performed the responses on their own. Modeling is an instructional procedure which involves demonstrating (modeling) a response or chain of responses to the students and directing the students to immediately imitate the demonstration. Models can be eliminated by gradually presenting a less demonstrative model until the students perform the responses on their own.

Modeling is a more efficient instructional procedure than prompting but the students have to be imitative before it may be used. Briefly, the general procedure for teaching students to imitate is for the teacher to say "Do this," present a model (such as clapping her hands), and then physically guide students through the response. The prompting is gradually faded until the students consistently make the response without assistance. When the students consistently imitate a wide range of object manipulations (e.g., roll ball, stacking blocks) and body gestures (e.g., stamping feet, standing up) they may be considered imitative.

### B. Functional Object Use

The prerequisite that the students readily interact with the objects and tasks they will encounter during instruction of the math sequence relates to the criteria for selection of tasks to teach a skill through. That is, if some of the criteria for selecting tasks are that they be functional, frequently occur across environments and have reinforcement value for individual students, then it would appear to be advantageous for the students to be

Student: Mary

| Skills | 1 | 2 | 3 |
|---|---|---|---|
| Imitation | | | |
| Motor | + | + | + |
| Verbal | | | |
| Isolated Sounds | + | + | + |
| Whole Words | - | - | - |
| Functional Object Use | + | + | + |
| Sets | + | + | + |
| One-Many | | | |
| One-to-One Correspondence | - | - | - |
| Equivalence | - | - | - |
| More/Less | | | |
| More | | | |
| Less | | | |
| More/Less | | | |
| Conservation of Number | | | |
| Counting Forward | | | |
| Rational | | | |
| Rote | | | |
| Numeral Recognition | | | |
| Matching Numerals to Quantities | | | |
| Matching Quantities to Numerals | | | |
| Ordering Numerals | | | |
| Ordering Quantities | | | |
| Addition | | | |
| Objects | | | |
| Numerals and Objects | | | |
| Numerals and Lines | | | |
| Numerals | | | |
| Fingers | | | |
| Facts | | | |
| Story Problems | | | |
| One-to-One Correspondence | | | |
| X + Y = ___ | | | |
| X + ___ = Y | | | |

+ = meets criterion

- = does not meet criterion

She made approximations.

Comments:

This evaluation indicates that the student has met the imitation criteria for motor and verbal behaviors. Verbal operations would be given emphasis in this student's program.

Student: Larry

| Skills | Tests |  |  |
|---|---|---|---|
|  | 1 | 2 | 3 |
| Imitation |  |  |  |
| Motor | + | + | + |
| Verbal |  |  |  |
| Isolated Sounds | - | + | - |
| Whole Words | - | + | - |
| Functional Object Use | + | + | + |
| Sets | - | - | - |
| One-Many |  |  |  |
| One-to-One Correspondence | - | - | - |
| Equivalence |  |  |  |
| More/Less |  |  |  |
| More |  |  |  |
| Less |  |  |  |
| More/Less |  |  |  |
| Conservation of Number |  |  |  |
| Counting Forward |  |  |  |
| Rational |  |  |  |
| Rote |  |  |  |
| Numeral Recognition |  |  |  |
| Matching Numerals to Quantities |  |  |  |
| Matching Quantities to Numerals |  |  |  |
| Ordering Numerals |  |  |  |
| Ordering Quantities |  |  |  |
| Addition |  |  |  |
| Objects |  |  |  |
| Numerals and Objects |  |  |  |
| Numerals and Lines |  |  |  |
| Numerals |  |  |  |
| Fingers |  |  |  |
| Facts |  |  |  |
| Story Problems |  |  |  |
| One-to-One Correspondence |  |  |  |
| X + Y = |  |  |  |
| X + __ = Y |  |  |  |

+ = meets criterion

- = does not meet criterion

Comments:

This evaluation indicates that the student has the prerequisite motor imitation and functional object use skills to enter the program at the level of sets. Verbal operations would be emphasized after the student has mastered the sound imitation criteria.

Student: Mike

| | Tests | | |
|---|---|---|---|
| Skills | 1 | 2 | 3 |
| Imitation | | | |
| Motor | - | - | - |
| Verbal | | | |
| Isolated Sounds | - | - | - |
| Whole Words | - | - | - |
| Functional Object Use | - | - | - |
| Sets | - | - | - |
| One-Many | | | |
| One-to-One Correspondence | | | |
| Equivalence | | | |
| More/Less | | | |
| More | | | |
| Less | | | |
| More/Less | | | |
| Conservation of Number | | | |
| Counting Forward | | | |
| Rational | | | |
| Rote | | | |
| Numeral Recognition | | | |
| Matching Numerals to Quantities | | | |
| Matching Quantities to Numerals | | | |
| Ordering Numerals | | | |
| Ordering Quantities | | | |
| Addition | | | |
| Objects | | | |
| Numerals and Objects | | | |
| Numerals and Lines | | | |
| Numerals | | | |
| Fingers | | | |
| Facts | | | |
| Story Problems | | | |
| One-to-One Correspondence | | | |
| X + Y = ___ | | | |
| X + ___ = Y | | | |

+ = meets criterion

- = does not meet criterion

Comments:

This evaluation indicates that the student does not have the requisite imitation skills to be included in the math program. When he meets criterion in the motor imitation and functional object use programs, he can begin the math program.

functionally using the objects or interacting with them (e.g., drink from cup, stir with spoon) before they are utilized in instructional tasks.

A deficit frequently exhibited by many severely handicapped students is that they do not readily interact with objects and/or people. Before implementing the math skills sequence students' interaction with various objects should be assessed, and if necessary, they should be taught to functionally use the objects and materials to be used in tasks in the math skills sequence.

## VII. Behavioral Objectives

While specific tasks, materials, and cues to respond are illustrated for each objective, students should demonstrate knowledge of the concept or ability to use an operation across a wide range of materials, tasks, and cues to respond. It is important to use only materials students have demonstrated they can discriminate (such as in Objective 2 of the Sets Program). For example, students should be able to discriminate the objects they are to match in one-to-one correspondence before the objects are used in the one-to-one correspondence program. Note: Do not follow this skills sequence as if it is a curriculum. Use the notions and criterion articulated above to adapt the skills sequence to individual students. It is expected that many components of the sequence will have to be broken into smaller steps for some students.

### A. Prerequisites

1. Imitation: The student should be able to imitate responses which may be required of him/her in the math skill sequence. The responses may include:

   Motor Imitation: Given the cue, "Do this," and a selected motoric gesture, the student should imitate the gesture.

      Subobjective: The student should imitate at least the following motoric gestures: a) touching an object; and b) moving or manipulating selected objects.

   Verbal Imitation: (Note: Students do not have to imitate verbal behaviors to progress through the skill sequence.) The student should be able to imitate (make gross approximations of) isolated sounds or whole words.

2. Functional Object Use: Presented with objects to be used in tasks of the skill sequence the student should be able to demonstrate at least one appropriate functional use of the object (e.g., spoon - stir; cup - drink).

### B. Sets

Examples of Potential Tasks:

Potential Functional Tasks:

1. Sort food items at snack time (e.g., put the milk on the shelf and cookies on the table).

2. Sort objects when setting up or cleaning up an activity (e.g., put the puzzles on the shelf and the balls in the box; put the plates on the shelf and the spoons in the drawer; put the crayons in the box and paint in the cupboard).

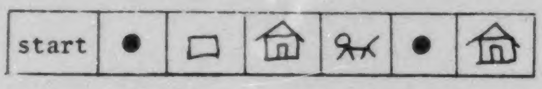
3. Join (add) sets when cleaning up or setting up an activity (e.g., put the paint and the crayons on the table; put the paper and scissors on the floor).

Potential Games:

1. Card games similar to "Old Maid" which require the student to sort and match cards on the basis of form, size, and/or color.

2. Sorting boxes, puzzles, peg boards which require objects to be sorted on the basis of form, size, and/or color.

3. Art activities which require the student to differentially operate on items which differ along dimensions of form, size, and color (e.g., color the house red and balls blue, paste the eyes on the head and paste the hands on the arms).

4. Board games (e.g., ) which require the students to draw a card and move their marker to the next square on the board which matches the card. Verbal students could be required to label the card (e.g., red, house, spoon) before advancing on the board.

Potential Tasks Which Are Applicable to Repeated Practice:

1. Sort or make sets of objects (e.g., block and bears, forks and cup, straws and cups) in instructional settings.

2. Sort or make sets of flannel items.

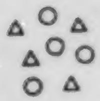
3. Sort or make sets of pictures.

Behavioral Prerequisites: Motor Imitation.

Behavioral Objective 1: Given a group of objects whose members differ along at least one dimension (e.g., forks and spoons) with one member of each set separated out to serve as a match cue, the student should sort the objects into separate sets when the teacher points and says, "Make a set of (spoons) and a set of (forks), put the (spoons) here and the (forks) here.

Match △

Cues ○



Group to be sorted

Instructional Sequence: The student should be able to sort into separate sets at least:

a. groups of objects of different colors

b. groups of objects of like color

Verbal Operation: The same procedure as in Objective 1 is followed. After the student correctly sorts the objects the teacher points and says, "This is a set of (spoons/forks). What is this set?" and the student should label the set (e.g., "spoons" or "forks").

Behavioral Objective 2: Given a group of objects whose members differ along at least one dimension, the student should sort the objects into separate sets when the teacher points and says, "Make a set of (cups) and a set of (plates). Put the (cups) here and the (plates) here."

Instructional Sequence: The student should be able to sort into separate sets:

a. objects

b. flannel items

Verbal Operation: The same procedure as in Objective 2 is followed. After the student correctly sorts the objects the teacher points and says, "What is this set?" and the student should label the set (e.g., "blocks" or "bears").

Behavioral Objective 3: Given three sets (e.g., Set 1, blocks; Set 2, bears; Set 3, pennies) of objects composed of from 1 to 5 members, and when the teacher touches one set of objects and says, "This is a set of (blocks/bears/pennies). Take the set of (blocks/bears/pennies)," the student should take the correct set.

Instructional Sequence: The student should take the correct set when presented:

a. two unlike sets with one object in each set

b. three unlike sets with one object in each set

c. three unlike sets with two like objects in each set

d. three unlike sets with one or two like objects in each set

e. The sequence is continued until the student demonstrates that he/she can discriminate unlike sets containing from one to five like members.

Verbal Operation: When the teacher presents three sets of objects, points to one set and says, "This is a set of (blocks), what is this set?" the student should label the set.

Behavioral Objective 4: When the teacher places two, two member sets with like members in front of the student (e.g., Set 1, blocks; Set 2, pennies) and says, "Take the set of (blocks)," the student should take the correct set.

Verbal Operation: The same procedure is followed as in Objective 4. After the student takes the correct set the teacher points and says, "What is this set?" and the student should label the set (e.g., "blocks").

Behavioral Objective 5: When the teacher places two, two member sets with unlike members in front of the student (e.g., Set 1, block and cup; Set 2, penny and pencil), displays a set identical to one presented to the student (e.g., block and cup) and says, "Take the set of (block and cup)," the student should take the correct set.

Verbal Operation: The same procedure is followed as in Objective 5. After the student takes the correct set the teacher says, "This is a set of (block and cup). What is this set?" and the student should label the set.

Behavioral Objective 6: When the teacher places three, two member sets with unlike members in front of the student (e.g., Set 1, block and cup; Set 2, penny and pencil; Set 3, bear and cup) and says, "Take the set of (block and cup)," the student should take the correct set.

Instructional Sequence: The student should take sets with unlike members when presented with:

a. two, two member sets with unlike members

b. three, two member sets with unlike members

Verbal Operation: The same procedure is followed as in Objective 6 after the student takes the correct set the teacher says, "What is this set?" and the student should label each member of the set (e.g., "block and cup").

Behavioral Objective 7: Given a group of two to four unlike objects (e.g., block, penny, pencil, cup) and when the teacher models making a two member set (e.g., block and cup) and says, "This is a set of (block and cup). Make a set of (block and cup)," the student should make the correct set.

Verbal Operation: The same procedure is followed as in Objective 7. After the student makes the set the teacher points and says, "This is a set of (block and cup). What is this set?" and the student should label each member of the set (e.g., "block and cup").

Behavioral Objective 8: Given a group of four unlike objects (e.g., block, penny, pencil, cup) and when the teacher says, "Make a set of (block and cup), the student should make the correct set.

Instructional Sequence: The student should be able to make a two member set given:

a. a group of two unlike objects

b. a group of three unlike objects

c. a group of four unlike objects

Verbal Operation: The same procedure as in Objective 8 is followed. After the student makes the correct set, the teacher points and says, "What is this set?" and the student should label each member of the set.

Behavioral Objective 9: Given a group of objects (3 to 6) which can be made into three separate sets on the basis of color, size or shape and when the teacher says, "Sort the objects into sets by (color/size/shape)" the student should sort the objects into sets along the dimension of color, size or shape.

Instructional Sequence: The student should be able to sort objects into sets when:

a. given three objects differing along at least one dimension

b. given six objects of like shape and size which can be sorted into three equal sets by color (cue - sort by color, make sets of different colors)

c. given six objects of like color and shape which can be sorted into three equal sets by size (cue - sort by size, make sets of different sizes)

d. given six objects of like color and size which can be sorted into three equal sets by shape (cue - sort by shape, make sets of different shapes)

e. given six objects all the same shape which may be sorted into three equal sets by color or size (cue - sort by [color/size], make sets of different [colors/sizes])

f. given six objects all the same color which may be sorted by [shape/size] , make sets of different [shapes/sizes])

g. given six objects all approximately the same size which may be sorted into three equal sets by color or shape (cue - sort by [color/shape], make sets of different [colors/shapes])

h. given six objects which may be sorted into three equal sets by shape, size or color (cue - sort by [color/shape/size], make sets of different [colors/shapes/sizes])

Verbal Operation: The same procedure as stated in Objective 9 is followed. After the student correctly responds, the teacher asks, "How did you sort?" and the student should name the appropriate dimension (i.e., color, size, or shape).

### C. One-Many

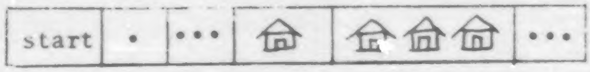
Examples of Potential Tasks:

Potential Functional Tasks:

1. Throughout the day students should be required to perform tasks which involve the concept of one and many (e.g., at snack time students could be offered treats and be asked to choose one or many; students who are verbal could be required to ask for one or many; the teacher could ask the students to give him/her one/many crayons; the teacher could ask the students to take one/many balls out to recess).

Potential Games:

1. A one-many component could be added to existing card and board games. That is, the students could be required to match cards to representations on the board on the dimension of one-many to advance to another square on the board

(e.g.,  ). See B. Sets - Examples of Potential Tasks for a more detailed description of the games).

Potential Tasks Which Are Applicable to Repeated Practice:

1. Make object sets of one and many in the instructional setting.
2. Make flannel item sets of one and many in the instructional setting.
3. Touch or label pictures of sets as one or many in the instructional setting.

Behavioral Prerequisites: Motor Imitation, B. Sets (Objective 2).

Behavioral Objective 1: Presented with a model of the correct response and sets of one and many like objects the student should take the set of one or the set of many when the teacher points to the correct set and says, "Take one" or "Take many."

Instructional Sequence: The student should be able to take the set of one or many when given a model and presented sets of:

a. objects grouped in sets of 1 and 4

b. objects grouped in sets of 1 and 3

c. 2-dimensional representations of one or many objects

Verbal Operation: Presented with a set of one or many like objects and when the teacher points and says, "This is (one/many). Is this one or many?" the student should say, "One" or "Many."

Behavioral Objective 2: Presented with sets of one and many like or unlike objects the student should take the set of one or the set of many when given the cue: "Take one" or "Take many."

Instructional Sequence: The student should be able to take one or many when presented sets of:

a. objects grouped in sets of 1 and 4

b. objects grouped in sets of 1 and 3

c. 2-dimensional representations of one or many objects

Verbal Operation: Presented with a set of one or many like or unlike objects and asked, "Is this one or many?" the student should say, "One" or "Many."

Behavioral Objective 3: Given a set of 6 objects and asked, "Take one" or "Take many," the student should take one or many objects.

Instructional Sequence: The student should be able to take a group of one or many objects when given:

a. a set of 6 like objects

b. a set of 6 unlike objects

Verbal Operation: The same procedure described in Objective 3 is followed. After the student takes the set with one or many objects and the teacher says, "That set has one or many. What does that set have?" and the student should say, "One" or "Many."

D. One-to-One Correspondence

Examples of Potential Tasks:

Potential Functional Tasks:

1. Throughout the day the student should be required to perform tasks which involve one-to-one correspondence (e.g., give each student a chair, give each student a cookie, put an ice cube in each glass, give each place setting a fork).
2. Students with the requisite skills should perform the potential functional tasks in the format delineated in I. Story Problem, 1. One-to-One Correspondence.

Potential Tasks Which Are Applicable to Repeated Practice:

1. Aligning sets of objects in arrangements which manifest one-to-one correspondence in the instructional setting.
2. Aligning sets of flannel items in arrangements which manifest one-to-one correspondence in the instructional setting.

Behavioral Prerequisite: B. Sets (Objective 2); See I. Story Problems, 1. One-to-One Correspondence.

Behavioral Objective 1: The teacher places a set of objects (e.g., cups) in a vertical array and gives another set of objects (e.g., straws) less than or equal in number to the first set to the student. When the teacher says, "Give each (cup) one/a (straw)," the student should assign objects on a basis of one-to-one correspondence between sets. If there was one (straw) for each (cup) the teacher says, "There are enough straws." If there was not a (straw) for each (cup), the teacher could say, "not enough straws" and wait for the student to ask or gesture for more (straws). When the student has given each (cup) a (straw), the teacher says, "There are enough." If the sets were unequal the teacher could also say "too many cups" and have the student take away the appropriate number of cups and then say there are enough.

Introductory Activity - Procedure: Students are seated around a table for "milk and cookie break" and a student is to give 1 cup or 1 napkin to each of the other 7 and put one in his own place.

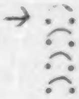
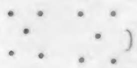
a. The teacher hands 1 cup or 1 napkin to a student and says, "Give one/a cup to Ed," "Give one/a cup to Mary," etc. or "Give one/a napkin to Laura," etc.

b. The teacher gives 8 cups or 8 napkins to a student and says, "Give one/a cup to everyone" or "Give one/a napkin to everyone." (Correction procedure: If the student has "left overs" or gives "too many" to one student, the teacher says, "Look, does everyone have one/a cup and napkin?" or "Look, Ed does not have one/a cup or napkin," etc.)

c. The teacher gives a student more than 8 cups and 8 napkins and says, "Give one/a cup to everyone," or "Give one/a napkin to everyone."

Instructional Sequence: The student should be able to establish one-to-one correspondence between sets of items which vary in material, relationship of materials, array and equivalence between sets. The following columns represent these parameters and a potential sequence within each parameter. Then a sequence which intergrates the parameters is suggested. There are many steps in the instructional sequence and teachers should teach each array and set equivalence. However, they may opt not to teach each array across all combinations of materials and materials relationships as delineated in the suggested sequence.

| Materials | Relationship of Materials | Arrays | Set Equivalence |
|---|---|---|---|
| 1. Objects | 1. Functionally Related Items (e.g., cups & saucers, straws & glasses) | 1. Vertical (e.g., $\begin{smallmatrix}\cdot&\cdot\\\cdot&\cdot\\\cdot&\cdot\end{smallmatrix}$ ) | 1. Equivalent sets & the student indicates that there are enough. |
| 2. Flannel Items | 2. Like Items (e.g., cups & cups) | 2. Horizontal (e.g., $\begin{smallmatrix}\cdot&\cdot&\cdot\\\cdot&\cdot&\cdot\end{smallmatrix}$ ) | 2. Unequal sets & the student indicates |
| 3. Pictures | | 3. Varied Arrays & students can align the sets in | |
| 4. Worksheets | | | |

| Materials | Relationship of Materials | Arrays | Set Equivalence |
|---|---|---|---|
| | 3. Unrelated Items (e.g., blocks & bears) | one-to-one correspondence (e.g., )<br> | that one set does not have enough & needs more. |
| | | 4. Domino configuration (e.g., ) | 3. Unequal sets & the student indicates that one set has too many & items should be taken away. |
| | | 5. Linear arrays (e.g., • • • \| • • •) This array is essential to addition. | 4. Unequal sets & the student indicates that one set does not have enough or that the other has too many & solves the problem by adding more or taking away. |
| | | 6. Varied arrays & the student is not allowed to move members of the sets (e.g., ) | |

a. Sets of objects which have a functional relationship (e.g., cups and straws) when the sets are equal in number (enough).

1. Vertical arrays
2. Horizontal arrays
3. Varied arrays and the students align the sets in one-to-one correspondence
4. Domino configurations
5. Linear arrays
6. Varied arrays and the students cannot move the items in the sets.

b. Sets of objects which have a functional relationship when the student's set does not have enough objects.

1. Vertical arrays
2. Horizontal arrays
3. Varied arrays and the students align the sets in one-to-one correspondence

4. Domino configurations
5. Linear arrays
6. Varied arrays and the students cannot move the items in the sets.

c. Sets of objects which have a functional relationship when the student set has too many objects.

   1. Vertical arrays
   2. Horizontal arrays
   3. Varied arrays and the students align the sets in one-to-one correspondence
   4. Domino configurations
   5. Linear arrays
   6. Varied arrays and the students cannot move the items in the sets.

   Throughout the remaining steps the arrays should be varied between the ones taught above and the student's set should have enough, not enough or too many.

d. Sets of objects which have a functional relationship.

e. Sets of flannel items or pictures which have a functional relationship (e.g., shirts and pants).

f. Like sets of objects (e.g., blocks and blocks).

g. Unlike sets of objects which have no functional relationship (e.g., blocks and bears).

h. Like sets of flannel items, or pictures (e.g., squares and squares).

i. Unlike sets of pictures or flannel items which have no functional relationship (e.g., shirts and chairs).

Verbal Operation: The teacher presents a set of objects, pictures or flannel items (e.g., cups) in a vertical array and presents another set of objects (e.g., straws) less than or equal to the first set to the student. When the teacher says, "Give each (cup) one/a (straw)," the student should assign objects (straws) on a basis of one-to-one correspondence between sets. Then when the teacher asks, "What can you do?" the student should say, "All done/enough/same" if the sets were equal or "Add/more" if the sets were not equal. If the student appropriately asks for "more," the teacher should give the student more (straws). When the student has given each (cup) a (straw), the student should then say, "enough/done/same." If the sets were unequal, the student could say "take away" and eliminate the appropriate number of items in response to the "What can you do?" question.

## E. Equivalence

Examples of Potential Tasks:

Potential Functional Tasks:

1. Utilize the same tasks that were used for one-to-one correspondence.

Potential Games:

1. An equivalence component should be added to existing card and board games. That is, students could be required to match cards on the basis of equivalence. See B. Sets - Examples of Potential Tasks for a description of the games. Games, such as dominos, which require matching on the basis of numerosity should be introduced.

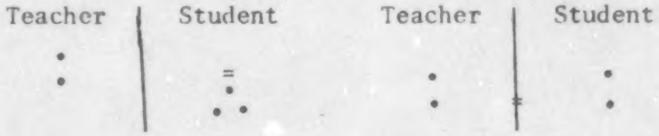
Potential Tasks Which Are Applicable to Repeated Practice:

1. Make equivalent sets of objects in the instructional setting.

2. Make equivalent sets of flannel items in the instructional setting.

Behavioral Prerequisites: C. One-Many; D. One-to-One Correspondence (Objective 1).

Behavioral Objective 1: When the teacher places a selected number of items (from 1 to 10) in his/her set and says, "Make your set equal to my set," the student should use the operation of one-to-one correspondence to make his/her set equal and then place an equals sign between the two sets, (i.e., the student should match members of his/her set with the teacher's until there are no unmatched members).



Instructional Sequence: The student should be able to make his/her set equal and place an equals sign when the items are arranged in:

a. Vertical arrays : = :

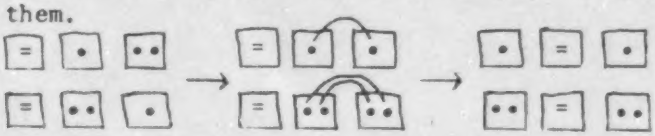
b. Horizontal arrays

c. Varied arrays

d. Linear arrays • • • = • • •

Verbal Operation: Students with verbal skills should be taught rational counting and be required to solve equivalence problems by counting the number of objects in the teacher's set, then counting out and placing the same number of objects in their set. When the teacher asks, "Are there enough?" or "Are the sets equal?", the students should check their answer by using the operation of one-to-one correspondence to insure that each member of the teacher's set is matched to a member of their set and then say "enough" or "equal." Verbal students without rational counting skills would not be required to count but only to say "equal" or "enough" after matching the members of the sets in one-to-one correspondence.

Behavioral Objective 2: Given two pairs of equal sets in a selected array and the cue, "Find the sets which are equal," the student should find equal sets by using the operation of one-to-one correspondence (See Objective 2) and then put an equals sign between them.



Subobjectives: The student should be able to find equal sets by using the operation of one-to-one correspondence when set members are arranged in vertical, horizontal, or linear arrays.

Verbal Operation: Students with verbal skills should be taught rational counting and should be required to solve equivalence problems by counting the number of objects in the sets and matching sets with equal numbers. When the teacher asks, "How can you tell the sets are equal?" the students should check their answers by using the operation of one-to-one correspondence to insure that a member of each set is matched to a member of its paired set and then say "equal." It is not necessary that verbal students be required to count.

F. More and Less

Examples of Potential Tasks:

Potential Functional Tasks:

1. Students should be required to perform tasks which involve the concepts of more and less throughout the day (e.g., at snack time students could be offered sets of many and few treats and asked to take either the set with more or the set with less; students who are verbal should be required to ask for the set with more or the set with less; the teacher could ask the students if they want more or less treats than another student).

Potential Games:

1. Games such as checkers, dominos, and races[6] in which the students align their pieces (e.g., dominos, checkers or tallies) in a configuration which manifests one-to-one correspondence at the end of the game to ascertain who has more and less to determine the winner.

Potential Tasks Which Are Applicable to Repeated Practice:

1. The students could denote sets of objects as more and less in the instructional setting.
2. The students could denote sets of flannel items as more and less in the instructional setting.
3. The students could denote pictures of object sets as more and less in the instructional setting.

1. More

Behavioral Prerequisites: C. One-Many (Objective 1); B. Sets (Objective 2); D. One-to-One Correspondence (Objective 1); G. Counting (1, Rational, Objective 3); and Equivalence (E. Equivalence, Objective 2).

Behavioral Objective 1: Given 2 sets unequal in quantity and the cue, "Take/touch more," the student should use the operation of one-to-one correspondence to choose the set with more (i.e., the student should match the objects in the sets in one-to-one correspondence and take/touch the set with at least one object left unmatched).

Instructional Sequence: The student should touch "more"

a. given sets of 2 and 10 objects in a vertical array aligned in one-to-one correspondence
b. given sets of 3 and 10 objects in a vertical array aligned in one-to-one correspondence
c. given sets of 2 and 7 objects in a vertical array aligned in one-to-one correspondence
d given sets of 3 and 5 objects in a vertical array aligned in one-to-one correspondence
e. given sets of 2 and 3 objects in a vertical array aligned in one-to-one correspondence

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[6] For example, numeral recognition races where teams or individuals compete to call out the numeral name first and a tally is scored for each win,
Team 1 | ////
Team 2 | ///////
. (See G. Counting - Examples of Potential Tasks for a more complete description of a numeral recognition game).

f. given sets of 5 and 6 objects in a vertical array aligned in one-to-one correspondence

g. follow a-f again and the student has to align the sets in one-to-one correspondence

h. given sets of objects in horizontal, domino, linear, and varied arrays

i. given sets of 3 and 10 2-D representations

j. given sets of 3 and 5 2-D representations

k. given sets of 5 and 6 2-D representations

Verbal Operation: Students with verbal skills should be taught rational counting and be required to solve the "more" problems by counting the objects in each set and saying the number in it. When the teacher points to each set and says, "Which is more, (number) or (number)?" the student should say, "(number) is more." Then when the teacher says, "How can you tell?" the student should say "match" and match the objects in the sets in one-to-one correspondence, point to the set with at least one object left unmatched and say, "more." Students who are verbal but do not rationally count should follow the procedure articulated in Objective 1, then point to the set with more and say, "More."

## 2. Less

Behavioral Prerequisite: F. More and Less (1. More).

Behavioral Objective 1: Given 2 sets unequal in quantity and the cue, "Take/touch not more," the student should use the operation of one-to-one correspondence (as described in "more") and take/touch the set with "not more."

Subobjective: The student should be able to take/touch the set with "not more" when presented sets: a) varying in number from 1 to 10; b) varying in spacial dimension (See the instructional sequence for "more").

Verbal Operation: Same as for "more" except the student must take the set with not more and say, "Not more."

Behavioral Objective 2: Given 2 sets unequal in quantity and the cue, "Take/touch less," the student should use the operation of one-to-one correspondence (as described in "more") to choose the set with "less."

Subobjective: The student should be able to take/touch the set with less when presented sets: a) varying in number from 1 to 10; b) varying in spacial dimension (See the instructional sequence for the "more").

Verbal Operation: Same as for "more" except the student must choose the set with less and say, "less."

### 3. More/Less

Behavioral Prerequisites: F. More and Less (1. More); F. More and Less (2. Less).

Behavioral Objective 1: Given 2 sets of varying quantities and the cue, "Take/touch (more/less)," the student should use the operation of one-to-one correspondence (as described in "more") to choose the set with more or less.

Instructional Sequence: The student should take/touch the set with more or less when presented with sets: a) varying in number from 1 to 10; b) varying in spacial dimension (See the instructional sequence for the "more").

Verbal Operation: Same as "more" except the student must choose the set with more or less and say, "more" or "less."

### 4. Conservation of Number

Behavioral Prerequisites: F. More and Less (3. More/Less)

Behavioral Objective 1: Presented two equivalent sets or two nonequivalent sets of from three to nine items aligned in an arrangement which manifests one-to-one correspondence and asked if the sets are equal the student should use the operation of one-to-one correspondence to determine if they are equal and indicate that they are equal or not equal. When the teacher either spreads all the members of both sets further apart or moves them closer together such that the sets are still arranged in a configuration which manifests one-to-one correspondence and asks if the sets are equal the student should indicate that the sets are still equal or not equal.

Correction Procedure: If a student errors, the teacher should rearrange the members of the sets in their original configurations and through the one-to-one correspondence operation demonstrate that the sets are equal or not equal. Then the teacher should help the student change the spatial arrangement of the members of the sets and demonstrate that the sets are still equal or not equal through the one-to-one correspondence operation. Note: Make this task into a fun game.

Instructional Sequence:

a. Sets containing three functionally related objects in a vertical array (e.g., ⁝⁝ → ⁝ ⁝ ) when the teacher spreads the objects apart.

b. Sets of five functionally related objects in vertical array when the teacher spreads the objects apart.

c. Sets of seven functionally related objects in a vertical array when the teacher spreads the objects apart.

d. Sets of nine functionally related objects in a vertical array when the teacher spreads the objects apart.

e. Sets of three, five, seven, and nine functionally related objects in horizontal (e.g., ⁚⁚⁚ → ⁚ ⁚ ⁚ ) and linear (e.g., ··· /··· → · · · ·/· · ·) arrays when the teacher spreads the objects apart. From here on vary using vertical, horizontal and linear arrays.

f. Follow steps a-e when the teacher moves the objects closer together. From here on vary spreading the objects apart and moving them closer together.

g. Sets of three, five, seven and nine like objects.

h. Sets of three, five, seven and nine unlike unrelated objects.

Behavioral Objective 2: Presented two equivalent sets or two nonequivalent sets of from three to nine items aligned in an arrangement which manifests one-to-one correspondence and when the teacher asks if the sets are equal the student should use the operation of one-to-one correspondence and then indicate that they are equal or not equal. When the teacher either spreads the members of one set apart or moves them closer together such that the two sets are no longer aligned in a configuration which manifests one-to-one correspondence and asks if the sets are equal the student should indicate that the sets are still equal or not equal.

Correction Procedure: If a student errors, the teacher should arrange the members of the sets in their original configurations and through the one-to-one correspondence operation demonstrate that the sets are either equal or not equal. Then the teacher should help the student change the spatial arrangement of the members of one set and demonstrate that the sets are still equal or not equal through the one-to-one correspondence operation. Note: Make this task into a fun game.

Instructional Sequence: Follow the sequence a-f of Objective 1 then:

g. Subgroup the members of one set (e.g., ::::: → :˙..˙ . ⁛.) instead of merely moving the members closer together or spreading them apart.

h. Vary the arrangement of the members of one set (e.g., ::::: → ⁛:.. ) instead of merely moving the members closer together or spreading them apart.

i. Sets of three, five, seven, and nine like objects.

j. Sets of three, five, seven and nine unlike unrelated objects.

Behavioral Objective 3: Presented two equivalent sets or two nonequivalent sets of three to nine items aligned in an arrangement which does not manifest one-to-one correspondence (use arrangements from objectives 2 and 3) and when the teacher asks if the sets are equal the student should use the operation of one-to-one correspondence to determine if they are equal and then indicate that the sets are equal or not equal. Then when the teacher adds one member to each set and asks if the sets are equal the student should indicate that the sets are still equal or not equal.

Correction Procedure: If a student errors, the teacher should take away the additional members and through the one-to-one correspondence operation demonstrate that the sets are equal or not equal. Then the teacher should help the student add one member to each set and demonstrate that the sets are still equal or not equal through the one-to-one correspondence operation.

Instructional Sequence: Follow the sequence delineated in Objective 1, a-f then:

a. Add two members to both sets.

b. Add three members to both sets.

Behavioral Objective 4: Presented two equivalent sets or nonequivalent sets of three to nine items aligned in an arrangement which does not manifest one-to-one correspondence (use arrangements from Objectives 2 and 3) and asked if the sets are equal the student should use the operation of one-to-one correspondence to determine if they are equal and then indicate that the sets are equal or not equal. When the teacher adds one member to only one set and asks if the sets are equal the student should use the operation of one-to-one correspondence to determine if the sets are still equal or not equal and indicate that the sets are either equal or not equal.

Correction Procedure: If a student errors, the teacher should take away the addition member and through the one-to-one correspondence operation demonstrate that the sets are equal or not equal. Then the teacher should help the student add a member to one set and demonstrate that the sets are equal or not equal through the one-to-one correspondence operation.

Instructional Sequence: Follow the same sequence delineated in Objective 1, a-f then:

a. Add two members to one set.

b. Add three members to one set.

Behavioral Objective 5: Presented two equivalent sets or nonequivalent sets of three to nine items aligned in an arrangement which does not manifest one-to-one correspondence (use arrangements from Objective 2 and 3) and the teacher asked if the sets are equal the student should use the operation of one-to-one correspondence to determine if they are equal and then indicate that the sets are equal or not equal. When the teacher takes one member away from each set and asks if the sets are equal, the student should indicate that the sets are still equal or not equal.

Correction Procedure: If a student errors, the teacher should add one member to each set and through the one-to-one correspondence operation demonstrate that the sets are equivalent or nonequivalent. Then the teacher should help the student add one member to each set and demonstrate that the sets are still equal or not equal through the one-to-one correspondence operation.

Instructional Sequence: Follow the sequence delineated in Objective 1, a-f then:

g. Take away two members from each set.

h. Take away three members from each set.

Behavioral Objective 6: Presented two equivalent sets or nonequivalent sets of three to nine items aligned in an arrangement which does not manifest one-to-one correspondence (use arrangements from Objectives 2 and 3) and asked if the sets are equal the student should use the operation of one-to-one correspondence to determine if they are equal and then indicate that the sets are equal or not equal. When the teacher takes away one member from only one set and asks if the sets are equal the student should use the operation of one-to-one correspondence and indicate that the sets are either equal or not equal.

Correction Procedure: If a student errors, the teacher should add a member to the set subtracted from and through the one-to-one correspondence operation demonstrate that the sets are equal or not equal. Then the teacher should help the student take a member away from one set and demonstrate that the sets are equal or not equal through the one-to-one correspondence operation.

Instructional Sequence: Follow the same sequence delineated in Objective 1, a-f then:

g. Take away two members from one set.

h. Take away three members from one set.

G. Counting Forward: Counting requires the students to make a verbal approximation of each number. Nonverbal students may be taught to make a gesture or sign to represent each number or to point to representations of each number on a number line and when appropriate the object being counted while counting.

Examples of Potential Tasks:

Potential Functional Tasks:

1. Throughout the day the students should be required to use counting operations (e.g., bring me three crayons, get two milks for snack).
2. Students who are learning to order numerals should be required to use the skill throughout the day (e.g., when lining up to go outside the teacher may say, "Tom you be number one/ first, Mary you be number three/ third. Terry you be number two/second; when preparing to play a game the teacher may assign turns by saying, "Mary you be number one/first, etc."; when assigning seats the teacher may say, "Terry, you sit in the first seat, etc.")

Potential Games:

1. Rational counting components should be added to the existing board games (e.g., the students could shake dice, spin a spinner, or turn over a card with a numeral on it, move their marker the appropriate number of squares and then perform the skill represented on the square to remain in the square, such as label a numeral | start | 3 | 6 | 8 | ).

2. Counting songs which incorporate rational counting, rote counting, and/or numeral recognition should be devised.

3. Numeral recognition races should be employed. These races could be between individual students or teams. The teacher could hold up a numeral and the first individual or team to call out the numeral name would receive a tally
   Team 1 | ////
   Team 2 | //////
   ; the team or individual with the most tallies would win. (See F. More - Examples of Potential Tasks for a description of how to use the concept of more to determine the winner). The teacher may design the game such that the same individuals or team do not consistently win or lose. Students often enjoy racing and to beat the teacher or their own best performance.

Potential Tasks Which Are Applicable to Repeated Practice:

1. Perform counting, numeral recognition, numeral ordering, etc. using objects, numerals, etc. in the instructional setting.

1. Rational

Behavioral Prerequisite: Verbal Imitation; B. Sets (Objective 2); C. One-Many (Objective 2).

Behavioral Objective 1: Presented a set of one to five objects arranged in horizontal or vertical arrays and asked, "How many (objects)?" the student should count the objects assigning a number (at least make a sound) to each object as he/she touches or moves it.

Instructional Sequence: The student should count the objects when presented:

a. a set of 1 to 3 objects in a horizontal array

b. a set of 3 to 5 objects in a horizontal array

c. a set of 1 to 5 objects in a horizontal array

d. a set of 1 to 5 objects in a vertical array

Behavioral Objective 2: Presented a set of one to five objects in a varied array and asked to count out a number less than the number in the array, the student should count out the correct number. (If this is too difficult for the student, he/she should be taught to arrange the objects in a horizontal or vertical array before or while counting.)

Instructional Sequence: The student should be able to count out the correct number of objects when:

a. asked to count out a number of objects equal to that presented;

b. asked to count out a number of objects less than that presented.

Note: Throughout this objective the students should be permitted to put the objects out in a vertical or horizontal array. In the objectives that follow the teacher may choose to place the objects only in the array the student used in this objective. (See I. Story Problems, 1. One-to-One Correspondence).

Behavioral Objective 3: Presented with one to five objects, six to ten objects, or eleven to fifteen objects in one, two, or three horizontal or vertical arrays and asked, "How many" or "Count the (objects)" the student should count the objects.

Instructional Sequence: The student should count the objects when presented:

a. a set of 6 to 8 objects in two horizontal arrays

b. a set of 8 to 10 objects in two horizontal arrays

c. a set of 6 to 10 objects in two horizontal arrays

d. a set of 6 to 10 objects in two vertical arrays

e. a set of 1 to 10 objects in one or two horizontal or vertical arrays

f. a set of 11 to 15 objects in three horizontal arrays

g. a set of 11 to 15 objects in three vertical arrays

h. a set of 11 to 15 objects in one, two, three horizontal or vertical arrays

i. a set of 1 to 10 in one horizontal or vertical array

j. a set of 10 to 20 in two horizontal or vertical arrays

k. a set of 20 to 30 in two horizontal or vertical arrays

l. a set of 1 to 30 in one, two, or three horizontal or vertical arrays

Behavioral Objective 4: Presented a varied array of one to twenty objects and asked to count out a number less than the array presented the student should count out the appropriate number of objects. (If this is too difficult for the student, he/she should be taught to arrange the objects in horizontal or vertical arrays before or while counting.)

Behavioral Objective 5: Presented with objects in crooked horizontal arrays and asked, "How many" or "Count the (objects)" the student should count the objects.

Instructional Sequence: Same as in Objective 3 except no vertical rows are presented and all rows are crooked.

Behavioral Objective 6: Presented objects which appear and then disappear, such as cars going down the street, the student should tally each object's appearance and then count his/her tallies when asked to, "Count the (objects)."

Behavioral Objective 7: Presented a varied array of two to thirty the student should count the objects without touching or displacing the objects.

Instructional Sequence: The student should be able to count varied arrays of objects when presented:

a. two to five objects and he/she marks each object as it is counted

b. two to five objects without marking each object as it is counted

c. five to ten objects and he/she marks each object as it is counted

d. five to ten objects without marking each object as it is counted

e. continue sequence

2. Rote

Behavioral Prerequisite: G. Counting (1. Rational, Objective 3).

Behavioral Objective 1: When the teacher says, "Count to (number)," (from one to five) the student should count to the number.

Instructional Sequence: The student should count to a number when asked to count to:

a. 2
b. 3
c. 4
d. 5

Behavioral Objective 2: When the teacher says, "Count from one to a (number)," and then asks, "What are you going to count from?" and "What are you going to count to?" the student should correctly answer the questions and then count.

Instructional Sequence: The student should count from one to a number when directed to count to:

a. 3
b. 4
c. 5
d. 6
e. 7
f. 8
g. 9
h. 10

Vary the number counted to from 1 to 10.

Behavioral Objective 3: When the teacher says, "Count from (number) to (number)," and asks, "What are you going to count from?" and "What are you going to count to?" the student should correctly answer the questions and then count.

Instructional Sequence: The student should count from a number to a number when directed to count:

a. from 2 to 5
b. from 3 to 6
c. from 1 to 8
d. from 4 to 9

Vary the combinations from 1 to 10.

Extended Sequence:

a. count to (a number) 1-20
b. from 1 to (any number) 1-20
c. from (any number) to (any number) to 20

d. count to (a number) 1-30
e. from 1 to (any number) 1-30
f. from (any number) to (any number) to 30

g. count to (a number) 1-40
h. from 1 to (any number) 1-40
i. from (any number) to (any number) to 40

j. count to (a number) 1-50
k. from 1 to (any number) 1-50
l. from (any number) to (any number) to 50

m. count to (a number) 1-60
n. from 1 to (any number) 1-60
o. from (any number) to (any number) to 60

p. count to (a number) 1-70
q. from 1 to (any number) 1-70
r. from (any number) to (any number) to 70

s. count to (a number) 1-80
t. count to (any number) 1-80
u. from (any number) to (any number) to 80

v. count to (a number) 1-90
w. from 1 to (any number) 1-90
x. from (any number) to (any number) to 90

y. count to (a number) 1-100
z. from 1 to (any number) 1-100
aa. from (any number) to (any number) to 100

## 3. Numeral Recognition

Behavioral Prerequisite: G. Counting (1. Rational, Objective 3).

Behavioral Objective 1: Given a cue to take/touch a numeral from 1 to 10 when the numerals are presented in varied arrays the student should take/touch the correct numeral.

Instructional Sequence: The student should be able to take/touch the correct numeral or math symbol when asked to take/touch numerals (math symbols) from:

a. 1 to 3 presented on a number line
b. 1 to 6 presented on a number line
c. 1 to 10 presented on a number line
d. "+" or "="[7]

e. 1 to 3 presented in a varied arrays
f. 4 to 6 presented in a varied arrays
g. 7 to 10 presented in a varied arrays
h. 1 to 10 presented in a varied arrays

Verbal Operation: Presented with a numeral from 1 to 10 and the cue, "What (numeral) is this," the student should be able to label numerals and math symbols when asked to label numerals from:

---

[7] The students should be taught to discriminate and label "+" as "plus" and "and"; and "=" as "equal" and "is."

a. 1 to 3 presented on a number line
b. 1 to 6 presented on a number line
c. 1 to 10 presented on a number line
d. "+" and "="

e. 1 to 3 presented in a varied array
f. 1 to 6 presented in a varied array
g. 7 to 10 presented in a varied array
h. 1 to 10 presented in a varied array

Extended Sequence:

a. 11 to 20 on a number line
b. 11 to 20 in a varied array
c. 20 to 30 on a number line
d. 20 to 30 in a varied array
e. 1 to 50 on a number line
d. 30 to 40 in a varied array
e. 40 to 50 in a varied array
f. 11-50 in a varied array
g. 1-70 on a number line
h. 70
i. 50-60 in a varied array

j. 11-60 in a varied array
k. 60-70 in a varied array
l. 11-70 in a varied array
m. 70-100 on a number line
n. 70-80 in a varied array
o. 11-80 in a varied array
p. 80-90 in a varied array
q. 11-90 in a varied array
r. 90-100 in a varied array
s. 11-100 in a varied array

Writing Numerals: Students who are learning to write should be taught to write numbers in mixed order when presented the cue "What is this number? Print this number." when a visual cue (model) is provided and when presented the cue "Print ___" when no visual cue is provided. For each step a-z the students should write numbers in order and after mastering writing numbers in order write them in mixed orders. For example, steps a-b would be as follows: $a_1$, visual cue 11-20 in order; $a_2$, visual cue 11-20 in mixed order; $b_1$, no visual cue 11-20 in order; $b_2$, no visual cue 11-20 in mixed order.)

a. visual cue 11-20

b. no visual cue 11-20
c. visual cue 20-30
d. no visual cue 20-30

e. no visual cue 11-30

f. visual cue 30-40
g. no visual cue 30-40
h. no visual cue 11-40

i. visual cue 40-50
j. no visual cue 40-50
k. no visual cue 11-50

l. visual cue 50-60
m. no visual cue 50-60
n. no visual cue 11-60

o. visual cue 60-70
p. no visual cue 60-70
q. no visual cue 11-70

r. visual cue 70-80
s. no visual cue 70-80
t. no visual cue 11-80

u. visual cue 80-90
v. no visual cue 80-90
w. no visual cue 11-90

x. visual cue 90-100
y. no visual cue 90-100
z. no visual cue 11-100
aa. no visual cue 1-100

4. Matching Numerals to Quantities

Behavioral Prerequisites: G. Counting (1. Rational, Objective 3); G. Counting (3. Numeral Recognition, Objective 1, Instructional Sequence Step 'h').

Behavioral Objective 1: Presented with a numeral from 1 to 10, a set of objects and the cue, "Count out this many," the student should count out the appropriate number of objects.

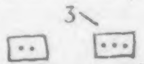
Instructional Sequence: The student should be able to count out the correct quantity given:

a. one numeral from 1 to 3
b. one numeral from 4 to 6
c. one numeral from 7 to 10
d. one numeral from 1 to 10

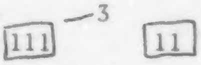
Subobjectives: The student should be able to match numerals to quantities in a worksheet format and match numerals to lines and figures.

Instructional Sequence:

a. match numerals to quantities in worksheet format



b. match numerals to lines



c. match numerals to fingers (this is a prerequisite to addition with fingers)

5. Matching Quantities to Numerals

Behavioral Prerequisites: G. Counting (1. Rational, Objective 3); G. Counting (3. Numeral Recognition, Objective 1, Instructional Sequence Step 'h').

Behavioral Objective 1: Given a set of objects from 1 to 10, a number line and the response cue, "Find the numeral which shows this many," the student should count the objects and then choose the appropriate numeral on the number line.

Instructional Sequence: The student should be able to match a quantity to a numeral given:

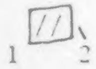
a. one quantity from 1 to 3
b. one quantity from 4 to 6
c. one quantity from 7 to 10
d. one quantity from 1 to 10

Subobjective: The student should be able to match quantities to numerals in a worksheet format and match lines and fingers to numerals.

Instructional Sequence:

a. match a quantity to a numeral in a worksheet format

b. match a quantity of lines to a numeral



c. match a quantity to an equal quantity of fingers (this is a prerequisite to addition with fingers)

6. Ordering Numerals

Behavioral Prerequisites: G. Counting (1. Rational, Objective 3); G. Counting (2. Rote, Objective 2); G. Counting (3. Numeral Recognition, Objective 1).

Behavioral Objective 1: When the teacher places a number card (e.g., |1|2|3|4|5|) on the table, puts numerals from one to five in front of the student in a varied array and says "Count to five" the student should count to five as the teacher points to the numerals on the number card. Then when the teacher says, "Match the numbers in order from one to five," the student should order his/her numerals by matching them to the numerals on the number card.

Behavioral Objective 2: When the teacher places numerals from one to five in front of the student in a varied array and says, "Put the numerals in order one, two, three, four, five," the student should order the numerals from least to most.

Behavioral Objective 3: When the teacher places numerals from one to five in front of the student in a varied array and says, "Put the numerals in order, start with one," the student should order the numerals from least to most.

Instructional Sequence:

a. Same as Objective 1 with numerals one through seven.

b. Same as Objective 2 with numerals one through seven.

c. Same as Objective 3 with numerals one through seven.

d. Same as Objective 1 with numerals one through ten.

e. Same as Objective 2 with numerals one through ten.

f. Same as Objective 3 with numerals one through ten.

Behavioral Objective 4: When presented with a number line (e.g., 1-5, 1-7, 1-10) with one, two, or three numbers missing, and the teacher says "Look. Count to (5/7/10). What number(s) is/are missing?" the student should tell the teacher which number(s) is/are missing.

Instructional Sequence:

a. Set : 1 _ 3 4 5
1 2 _ 4 5
1 2 3 _ 5
1 2 3 4 _

b. Set 2 1 _ 3 _ 5
_ 2 _ 4 5
_ _ 3 4 5
1 2 _ _ 5
1 2 3 _ _

c. Set 3: 1 _ _ _ 5
_ _ _ 4 5
_ _ 3 _ _
_ 2 _ _ 5
1 _ _ 4 5

Behavioral Objective 5: When presented with a number line with one, two, or three numbers missing and the teacher says, "What number(s) is/are missing?" the student should say which number(s) is/are missing.

Instructional Sequence: Same as in Objective 4.

Behavioral Objective 6: This objective is appropriate for students who can write numbers in sequence (i.e., 1-3, 1-7, 1-10) dot to dot (e.g., 1 _ _ _ _ _ 7).

When presented with a number line (e.g., 1 _ _ _ _ _ 7) with one, two or three numbers missing and the teacher says, "Count what number(s) is/are missing. Print the missing number(s)." the student should print in the missing numbers.

Instructional Sequence: Same as Objective 4.

Behavioral Objective 7: When presented with a number line (e.g., 1-5, 1-7, or 1-10) and the teacher says, "Touch the number that comes after (_), what number comes after (_)?" the student will touch and label a number which comes after a given number.

Behavioral Objective 8: When presented with a number line one (e.g., 1-5, 1-7, or 1-10) and asked, "What number comes after (_)?" the student will label the number which comes after the given number.

Behavioral Objective 9: When the teacher asks, "What number comes after (_)?" the student should label the number that comes after the given number.

Instructional Sequence for Before, More and Less:

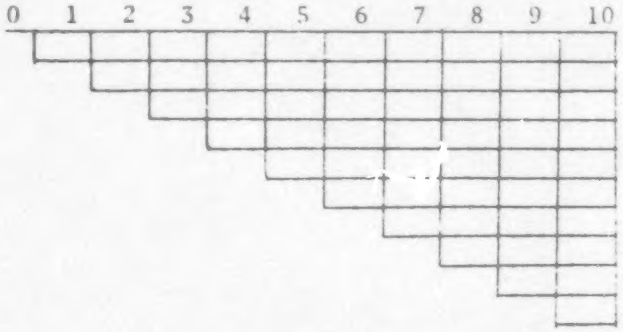
a. Same as Objective 7 except the teacher says, "Touch the number(s) which come(s) before (_). What number(s) come(s) before (_)?"

b. Same as Objective 8 except the teacher asks, "What number(s) come(s) before (_)?"

c. Same as Objective 9 except the teacher asks, "What number(s) come(s) before (_)?"

d. Same as Objective 7 except the teacher says, "Touch the number(s) which is/are more than (_). Tell me some/a number(s) which is/are more than (_)?"

Note: Number lines of the following form should facilitate the instruction of the concepts of "More" and "Less."



e. Same as Objective 8 except the teacher asks, "Tell me some/a number(s) which is/are more than (_)?"

f. Same as Objective 9 except the teacher asks, "Tell me some/a number(s) which is/are more than (_)?"

g. Same as Objective 7 except the teacher says, "Touch the number(s) which is/are less than (_). Tell me some number(s) which is/are less than (_)?"

h. Same as Objective 8 except the teacher asks, "Tell me some/a number(s) which is/are less than (_)?"

i. Same as Objective 9 except the teacher asks, "Tell me some/a number(s) which is/are less than (_)?"

### 7. Ordering Quantities

Behavioral Prerequisites: F. More and Less; G. Counting, 6. Ordering Numerals.

Behavioral Objective 1: Presented with from one to five sets of unequal quantities (varying from one to five) and asked to, "Order the sets of (objects) or (2-D representations)," the student should count the number of objects in each set and place the set with more objects (the number which comes after in counting) to the right of the set with less (the number which comes before in counting). The student should then check this ranking by matching the objects in the sets using the one-to-one correspondence operation to insure that a set with at least one left over was placed to the right of the matched set.

Instructional Sequence: The student should be able to order sets when given:

- a. two sets varying in quantity from 1 to 2
- b. three sets varying in quantity from 1 to 3
- c. four sets varying in quantity from 1 to 4
- d. five sets varying in quantity from 1 to 5

## H. Addition

The addition objectives articulated here require the students to use the operation of rational counting in solving the problems. As described in the rational counting objectives, this operation requires the students to make a verbal approximation of each number as they touch the objects being counted. Nonverbal students could be taught to solve addition problems by making gestures to represent each number or number statement or by pointing to representations of each number or number statement.

Examples of Potential Tasks:

Potential Functional Tasks:

1. Students who have the requisite skills should be required to use addition in the format delineated in I. Story Problems, 2. X + Y = __ and/or 3. X + __ = Y.

Potential Games:

1. An addition component should be added to the existing board and card games (e.g., | start | 1 + 1 = __ | 2 + 3 = __ | 5 + 1 = __ |)

   That is, when students land on a square they should be required to solve an addition problem in order to remain on the square.

2. Students who are learning math facts should participate in math fact races.

Potential Tasks Which Are Applicable to Repeated Practice:

1. Performing addition problems with objects, flannel items, lines, numerals, and fingers in the instructional setting.

Cognitive Tasks:

Mastery of these tasks is not a prerequisite to a student's being taught addition. In fact, it is not expected that students will have met the prerequisites for these tasks before they are taught addition. After students have mastered the prerequisites for these tasks they should be taught them across many materials with various numbers of objects in the sets. Do not skip these tasks. They are essential to a student's mastery of the underlying conceptual base of addition. That is, the concept that the sum of two sets is greater/more then either component set.

Behavioral Prerequisites: F. More/Less (4. Conservation of Number, Objective 6); G. Counting (1. Rational, Objective 3); G. Counting (3. Numeral Recognition); G. Counting (4. Matching Numerals to Quantities); G. Counting (5. Matching Quantities to Numerals); G. Counting (6. Ordering Numerals, Objective 9).

Behavioral Objective 1: When the teacher places a number line with removeable numerals, a set of (2) (cups) and a set of (3) (saucers) in front of the student and asks:

a. "How many (cups) are there?" the student should count the (cups), state the number and place the correct numeral from the number line next to a picture of a (cup).

b. "How many (saucers) are there?" the student should count the (saucers), state the number and place the correct numeral from the number line next to a picture of a (saucer).

c. "Join/give each (cup) a (saucer)," the student should join the sets, count the total number of objects, and place the correct numeral from the number line next to a picture of (cups and saucers).

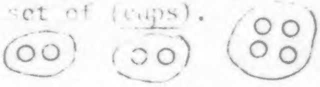
d. "Are there more (cups/saucers) or more (cups and saucers)?" (Note: Frequently reverse the order of the question such that the correct response is not always the second portion of the question, e.g., "Are there more (cups and saucers) or more (cups/saucers)?") The student should say, "There are more (cups and saucers)." Then when the teacher asks, "How can you tell?" the student should say "(5) cups and saucers) is more than (number) (cups/saucers)."

Behavioral Objective 2: When the teacher places a set of (2) (cups) and a set of (3) saucers) in front of the student and asks, "Are there more (cups/saucers) or more (cups and saucers)?" (Note: Again frequently reverse the order of the question). The student should say, "There are more (cups and saucers)." Then when the teacher asks, "How can you tell?" the student should say "(5) (cups and saucers) is more then (number) (cups/saucers)."

### 1 Addition With Objects

Behavioral Prerequisites: B. Sets (Objective 8); E. Equivalence (Objective 2), and G. Counting (1. Rational, Objective 3).

Behavioral Objective 1: Given two sets of objects (e.g., cups, cups) and when the teacher points and says, "This is a set of (cups) and this is a set of (cups), (plus/join) the sets," the student should join the sets. Then when the teacher says, "Now you have one set of (cups). Point to the set of (cups)," the student should point to the set of (cups).

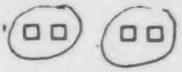


Instructional Sequence: The student should join sets of:

a. boys, girls
b. objects
c. flannel items

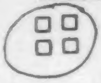
Verbal Operation: Same as described in Objective 1. After the student joins the sets the teacher says, "Now you have a set of (cups)," "What is this set?" and the student should say, "A set of (cups)."

Behavioral Objective 2: Given two sets of objects (e.g., blocks, blocks) and when the teacher points to one set and says:

a. "How many (blocks) are there?"  (the teacher points to the first set) the student should count the (blocks) and state the number.

b. "How many (blocks) are there?" (the teacher points to the second set) the student should count the (blocks) and state the number.

c. "Plus/join the sets of (blocks) and (blocks) the student should join the sets.



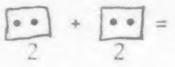
d. "How many (blocks) are there?" the student should count the (blocks) and state the number.

2. Numerals and Objects

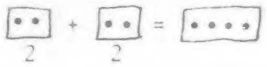
Behavioral Prerequisites: G. Counting (3. Numeral Recognition, Objective 1); G. Counting (4. Matching Numerals to Quantity, Objective 1); G. Counting (Matching Quantities to Numerals, Objective 1); G. Counting (1. Rational, Objective 3); H. Addition (1. Addition With Objects, Objective 2).

Behavioral Objective 1: Presented with two factor boxes containing a selected number of like objects (1-10) (e.g., balls, balls), a number line from 1-10 with removeable numerals, and the cue, "Find the numeral that shows how many," the student should:

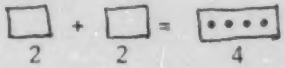
a. Count the number of objects in each factor box and place the correct numeral under it.



b. Move the objects from the factor boxes to the sums box.

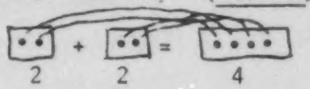


c. Count the objects in the sum's box and place the correct numeral under it.



d. Point to each numeral and math symbol and say: "(2) (balls) (and/plus) (2) (balls) (is/equals) (4) (balls)." or "(2) (and/plus) (2) (is/equals) (4)."

e. When the teacher asks, "Does (number) and (number) equal (number)" the student should label the numeral under each factor box, count out that number of objects and place them in each factor's box and then align the items in the factors' boxes and the items in the sums box in one-to-one correspondence and say "(number) plus (number) equals (number)."



Instructional Sequence: The student should perform steps a-d when:

a. the teacher cues or prompts each step,

b. without teacher cues or prompts.

3. Numerals and Lines

Note: Teachers sometimes opt to skip addition with lines and go directly to "5. Fingers" because addition with fingers is a more functional skill across environmental configurations.

Behavioral Prerequisites: H. Addition: (2. Numerals and Objects, Objective 1), motoric ability to draw lines.

Behavioral Objective 1: Presented with two factor boxes containing a selected number of lines (1-10), a number line from 1-10 with removeable numerals and the response cue, "Find the number that shows how many," the student should:

a. count the number of lines in each factor box and put the correct numeral under it;

b. count the number of lines in both factor boxes and draw the number of lines counted to in the sum's box;

c. place the correct numeral under the sum's box;

d. point to each numeral and symbol and say, "(2) and/plus (2) is/equals (4)."

[// + // = ____] [// + // = ____] [// + // = ////]
2 2 2 2 4

Self-Correction Procedure: At this point the student should be taught a procedure for checking his/her answer. After the student has completed Objective 1 the teacher points to each side of the equal sign and asks, "Are the sides equal?" And when the student responds, "Yes/No," the teacher asks, "How can you tell?" and the student should count the lines on each side of the equal sign and say, "(4) equals (4)." (The student could also match the objects or lines on each side of the equals sign in one-to-one correspondence to show that the sides are equal.)

Instructional Sequence: The student should perform steps a-d when:

a. the teacher cues or prompts each step.

b. without teacher cues or prompts.

4. Numerals

Behavioral Prerequisites: H. Addition (3. Numerals and Lines).

Behavioral Objective 1: Given an equation of the form 2 + 2 = __, a number line with removeable numerals and the cue, "Find the number which shows how many," the student should:

a. draw the appropriate number of lines under each of the factor boxes;

b. count all the lines and state the number;

c. draw the number of lines stated under the sum's box;

d. place the appropriate numeral (from the number line) in the sums box;

e. point to each numeral and math symbol and say "(2) plus (2) equals (4)."

[2 + 2 = ____] → [2 + 2 = ____] → [2 + 2 = ____] →
// // // // ////

[2 + 2 = 4 ].
// // ////

Self-Correction Procedure: Same as described in Addition With Numerals and Lines.

Instructional Sequence: The student should perform steps a-c when:

a. the teacher cues or prompts each step,

b. without cues or prompts.

See I. Story Problems, 2. X + Y = __.

### 5. Fingers

Behavioral Prerequisites: H. Counting (2. Rote, Objective 3).

Behavioral Objective 1: Given an equation of the form 2 + 3 = __ when the teacher asks the student:

a. "Which side do you start counting on?" the student should touch the side without the empty box (i.e., the side to the right of equals sign).

b. "What do you count to?" the student should count on his finger(s) to the number in the second factor box (e.g., 3) and then while holding up those finger(s) (3) and starting with the number in the first factor box (e.g., 2) the student should count the fingers held up (e.g., 3 - 4 - 5), say the number counted to (5) and place it in the sums box;

c. "What does (two) plus (three) equal (_____)?" the student should say, "(two) plus (three) equals (five)."

[2 + 3 = ___]   [2 + 3 = 5 ]

Self-Correction Procedure: After the student completes Objective 1 and when the teacher asks, "How can you tell," the student should draw lines under each numeral and use the correction procedure described in "Addition With Numerals and Lines."

Behavioral Objective 2: The student should be able to perform the behaviors listed in Objective 1 (a-c) without teacher cues.

See I. Story Problems, 2. X + Y = __.

Behavioral Objective 3: Given an equation of the form __ + 2 = 5 or 2 + __ = 5 and when the teacher asks the student the following:

a. "Which side do you start counting on?" the student should touch the side without any empty box.

b. "What do you count to?" the student should point to the numeral on the side of the equation without an empty box and label it (e.g., 5).

c. "What number do you start counting from?" the student should point to the numeral on the side of the equals sign with an empty box and label it (e.g., 2).

d. "(2) plus how many equals (5)?" the student should start counting with the numeral on the side of the equals sign with an empty box (e.g., 2) and count up to the numeral on the side of the equals without an empty box (e.g., 5) holding up a finger (or drawing a line) for each number he/she counts (e.g., 3, 4, 5). Then the student should count the fingers he/she is holding up, say the number counted to (e.g., 5) and place this numeral in the sum's box.

e. "(2) plus how many equals (5)?" the student should say "(2) plus (3) equals (5)."

Instructional Sequence: The student should add with his/her fingers given problems of the form:

a. 2 + ___ = 5

b. ___ + 3 = 5

Self-Correction: After the student completes Objective 3 and when the teacher asks, "How can you tell?" the student should draw lines under each numeral and use the correction procedure described in "Addition With Numerals and Lines."

Behavioral Objective 4: Given an equation of the form ___ + 2 = 5 or 2 + ___ = 5 the student should be able to perform the behaviors listed in Steps a through e (Behavioral Objective 3) correctly and in sequence without any teacher cues. See I. Story Problems, 3. X + ___ = Y.

## 6. Facts[8]

Behavioral Prerequisites: G. Counting (2. Rote, Objective 3); H. Addition (4. Numerals, Objective 1), and/or H. Addition (5. Fingers, Objective 2).

Behavioral Objective 1: When orally presented problems of the form zero plus one, one plus one, two plus one ... up to nine plus one, the student should state the answer for each problem.

Instructional Sequence: The student should be able to state the answer when given the problems:

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[8] These objectives should be taught through group and individual drills. There should be an emphasis on rapid rates of responding. Races which emphasize rate should be utilized to teach math facts. Races are fun and because they require rapid and accurate responding, they should facilitate rote memorization of facts.

a. in sequence (i.e., one plus one, two plus one, etc.) presented visually;

b. in sequence presented orally;

c. in random order.

Behavioral Objective 2: When presented orally in sequence with problems of the form: $5 + 0 = 5$, $5 + 1 = 6$, $5 + 2 = \underline{\quad}$, $5 + 3 = \underline{\quad}$, etc. the student should be able to state the answer for each problem.

Instructional Sequence:

a. Problems presented visually (e.g., on the blackboard) and orally

$$\begin{array}{l} 5 + 0 = 5 \\ 5 + 1 = 6 \\ 5 + 2 = \underline{\quad} \\ 5 + 3 = \underline{\quad} \end{array}$$

b. Problems presented orally.

Behavioral Objective 3: When orally presented with a problem where the first factor is more than the second factor (e.g., $5 + 2 = \underline{\quad}$), the student should derive the answer by performing a series of problems starting with $\underline{X} + 0 = \underline{X}$. (e.g., $5 + 0 = 5$, $5 + 1 = 6$, $5 + 2 = 7$).

Instructional Sequence:

a. Problems presented visually (e.g., on the blackboard) and orally

$$\begin{array}{lcl} & & 5 + 0 = 5 \\ 5 + 2 = \underline{\quad} & \rightarrow & 5 + 1 = 6 \\ & & 5 + 2 = 7 \end{array}$$

b. Problems presented orally.

Behavioral Objective 4: When orally presented with number pair problems such as one plus one, two plus two ... up to ten plus ten, the student should state the answer.

Behavioral Objective 5: When orally presented with a problem where the first factor is less than the second factor (e.g., $4 + 5 = \underline{\quad}$) the student should derive the answer by using an addition sequence starting with the number pair of the first factor

$$\begin{array}{lcl} & & 4 + 4 = 8 \\ 4 + 6 = \underline{\quad} & \rightarrow & 4 + 5 = 9 \\ & & 4 + 6 = 10 \end{array}$$

Instructional Sequence:

a. Problems presented visually (e.g., on the blackboard) and orally of the form:

1. 0
   1
   2
   3
   4
   5
   4 + 6 =

2. and the teacher points and says, "What does four plus six equal?" "What number should we start counting with?" the student should find the number pair of the first factor and say 4 + 4 and go through the sequence from 4 + 4 = 8 to 4 + 6 = 10 as the teacher writes it out.

3. 0
   1
   2
   3
   4 + 4 = 8
   4 + 5 = 9
   4 + 6 = 10

b. Problems presented visually (e.g., on the blackboard) and orally of the form:

1. 4 + 6 =

2. and the teacher asks, "What does four plus six equal?" the student should go through the sequence starting with the number pair of the first factor as the teacher writes the sequence on the board.

3. 4 + 4 = 8
   4 + 5 = 9
   4 + 6 = 10

c. Problems presented orally.

Behavioral Objective 6: When orally presented addition problems with sums up to 10, the student should state the answer.

I. Story Problems

Examples of Potential Tasks:

Potential Functional Tasks:

1. Students should be required to solve problems in the story problem formats delineated below throughout the day (e.g.,

when students are passing out pencils to four students and they only have two pencils, they must figure out how many more pencils they need, 2 + __ = 4; when an item costs ten cents and students only have eight cents they should figure out how many more cents they need, 8 + __ = 10; students who have six cents and are given five cents should figure out how many cents they have altogether 6 + 5 = __; students who have won five checkers and then win two more should figure out how many checkers they won altogether, 5 + 2 = __).

## 1. One-to-One Correspondence

Behavioral Prerequisites: Motor Imitation; B. Sets (Objective 2); G. Counting (1. Rational, Objective 2).

Behavioral Objective 1: When the teacher presents a set (e.g., students) and presents a student with a set of objects (e.g., cookies) less than, equal to, or more than the first set and says, "Give each (student) one/a (cookie)," the student should assign objects (cookies) in an arrangement which manifests one-to-one correspondence between sets. When the teacher asks, "Were there enough (cookies) or not enough (cookies)?" the student should say "enough," "not enough" or "too many." If there were "not enough" then the teacher asks, "What can you do?" the student should say "Add"/"More" or "Add (number)/(number) more." If there were "too many" the student should say "Take away" or count and say "Take away (number)."

Instructional Sequence: The student should be able to establish one-to-one correspondence between sets of items which vary in material, relationship of materials, array and equivalence between sets. The following columns represent these parameters and a potential sequence within each parameter. Then a sequence which intergrates the parameters is suggested. There are many steps in this instructional sequence and teachers should teach each array and set equivalence. However, they may opt not to teach each array across all combinations of materials and material relationships as delineated in the suggested sequence.

| Materials | Relationship of Materials | Arrays | Set Equivalence |
|---|---|---|---|
| 1. Objects | 1. Functionally Related Items (e.g., cups & saucers, straws & glasses) | 1. Vertical (e.g., ⁝⁝ ) | 1. Equivalent sets & the student indicates that there are enough. |
| 2. Flannel Items | | 2. Horizontal (e.g., ∶∶∶ ) | |
| 3. Pictures | | | |

| Materials | Relationship of Materials | Arrays | Set Equivalence |
|---|---|---|---|
| 4. Worksheets | 2. Like Items (e.g., cups & cups)<br>3. Unrelated Items (e.g., blocks & bears) | 3. Varied arrays & students can align the sets in one-to-one correspondence (e.g., ∴ ∴ : : :) | 2. Unequal sets & the student indicates that one set does not have enough & needs (number) more or add (number). |
| | | 4. Domino configuration (e.g., ⁘ ⁙)<br>5. Linear arrays (e.g., . . . \| . . .) This array is essential to addition. | 3. Unequal sets & the student indicates that one set has too many & (number) items should be taken away. |
| | | 6. Varied arrays & the student is not allowed to move members of the sets (e.g., ∴ ∴ ) | 4. Unequal sets & the student indicates that one set does not have enough or that the other has too many & solves the problem by adding more or taking away. |

a. Sets of objects which have a functional relationship (e.g., cups and straws) when the sets are equal in number (enough).

1. Vertical arrays
2. Horizontal arrays
3. Varied arrays and the students align the sets in one-to-one correspondence
4. Domino configurations
5. Linear arrays
6. Varied arrays and the students cannot move the items in the sets

b. Sets of objects which have a functional relationship when the student's set does not have enough objects. Throughout the remaining objectives the student having enough or not enough objects should be randomly varied.

1. Vertical arrays
2. Horizontal arrays
3. Varied arrays and the students align the sets in one-to-one correspondence
4. Domino configurations
5. Linear arrays
6. Varied arrays and the students cannot move the items in the sets

c. Sets of objects which have a functional relationship when the student's set has too many objects.

1. Vertical arrays
2. Horizontal arrays
3. Varied arrays and the students align the sets in one-to-one correspondence
4. Domino configurations
5. Linear arrays
6. Varied arrays and the students cannot move the items in the sets

Throughout the remaining steps the arrays should be varied between those taught above and the student's set should have enough, not enough, or too many items.

d. Sets of objects which have a functional relationship.

e. Sets of flannel items or pictures which have a functional relationship (e.g., shirts and pants).

f. Like sets of objects (e.g., blocks and blocks).

g. Unlike sets of objects which have no functional relationship (e.g., blocks and bears).

h. Like sets of flannel items, or pictures (e.g., squares and squares).

i. Unlike sets of pictures or flannel items which have no functional relationship (e.g., shirts and chairs).

2. X + Y = __

Behavioral Prerequisites: H. Addition (4. Numerals, Objective 1 and/or 5. Fingers, Objective 2 - If the student meets the fingers prerequisite, have him/her solve all problems using fingers.)

Behavioral Objective 1: When the teacher presents a story problem of the form 2 + 2 = __ and says we can make stories into math problems, watch:

a. Using a student or him/herself as a model the teacher says, "Tom has two records" and points to the records. "What can we write down" and the student should say "Two." Then the teacher writes the numeral two and says, "Write two."

2

b. The teacher gives Tom two more records and says "I give Tom two records. If I give what do you do?" and the student should say "Plus/add." Then the teacher writes a plus and says, "Write a plus."

2 +

c. The teacher says, "How many records did I give Tom?" and the students should say "Two." The teacher says, "What should we write?" and the students should say "Two." Then the teacher writes two and says, "Write two."

2 + 2

d. The teacher says, "Do you know how many records? No. What do you write?" and the students should say "Equals." The teacher then writes an equals and says, "Write equals."

2 + 2 =

e. The teacher says, "We can find out how many records Tom has by counting or by solving the problem 2 + 2 = __. "Solve the problem." and the students should draw two lines under the second numeral 2 + 2 = __. Start counting
//
from the first numeral (2) and count up on the line (3, 4) and say "Four" and write "Four" in the blank.

2 + 2 = 4
//

f. The teacher says, "How many records does Tom have?" and the students should say, "Four." Then the teacher says, "Let's check," counts the records, says "Four" and then says, "Right, Tom has four records and our problem says Tom has four records."

Behavioral Objective 2: The students should solve the problems when the teacher does not write them or state answers prior to the students' solving the entire problem.

Behavioral Objective 3: The students should solve the problem using fingers instead of lines (See H. Addition, 5. Fingers, Objective 2).

Behavioral Objective 4: The students should solve the problems when the teacher orally presents the problems (no object prompts) such as, "Tom has two balls and I gave him two balls. How many balls does he have? Solve the problem."

Behavioral Objective 5: Students who can read should be taught to solve story problems that are presented in printed form.

3. X + __ = Y

Behavioral Prerequisites: H. Addition (5. Fingers, Objective 4).

Behavioral Objective 1: When the teacher presents a story problem of the form 2 + __ = 4 and says, "We can make stories into math problems, watch":

a. "Using a student or him/herself as a model the teacher says, "Tom has two spoons" and points to the spoons. "What can we write down?" and the students should say "Two." Then the teacher writes the numeral two and says, "Write two."

2

b. The teacher holds up four spoons and says, "Tom needs four spoons. Do you know how many spoons Tom needs? Yes. What do you write?" and the students should say, "Equals four." The teacher then writes equals four and says, "Write equals four."

2 = 4

c. The teacher says, "What should we do?" and the students should say, "Count from two to four." Next the teacher says, "When we count from two to four, what do we write?" and the students should say, "Add/plus/count up." Then the teacher should write a plus and say, "Write plus."

2 + = 4

d. The teacher says, "Solve the problem" and the student should start counting from two, hold up a finger for each number he/she counts (e.g., 3, 4), stop at (four), count his/her fingers and say, "(Two)" and place that numeral in the empty slot to the left of the equals.

2 + 2 = 4

e. The teacher says, "(Two) count up how many equals (four)?" and the student should say, "(Two) count up (two) equals (four)."

f. The teacher says, "How many spoons does Tom need?" and the student should say "(Two)."

Behavioral Objective 2: The students should solve the problems when the teacher does not write or state the answer prior to the students' solving the entire problem.

Behavioral Objective 3: The students should solve the problems when the teacher orally presents the problems (no object prompts) such as, "Tom has two spoons and needs four. How many more spoons does Tom need? Solve the problem."

Behavioral Objective 4: Students should be able to solve functional problems, such as when setting the table and they need four spoons but only have two, they get two more spoons.

Behavioral Objective 5: Students who can read should be taught to solve story problems that are presented in printed form.

## VIII. Basic Procedures for Initial Assessment and Skill Mastery Evaluation

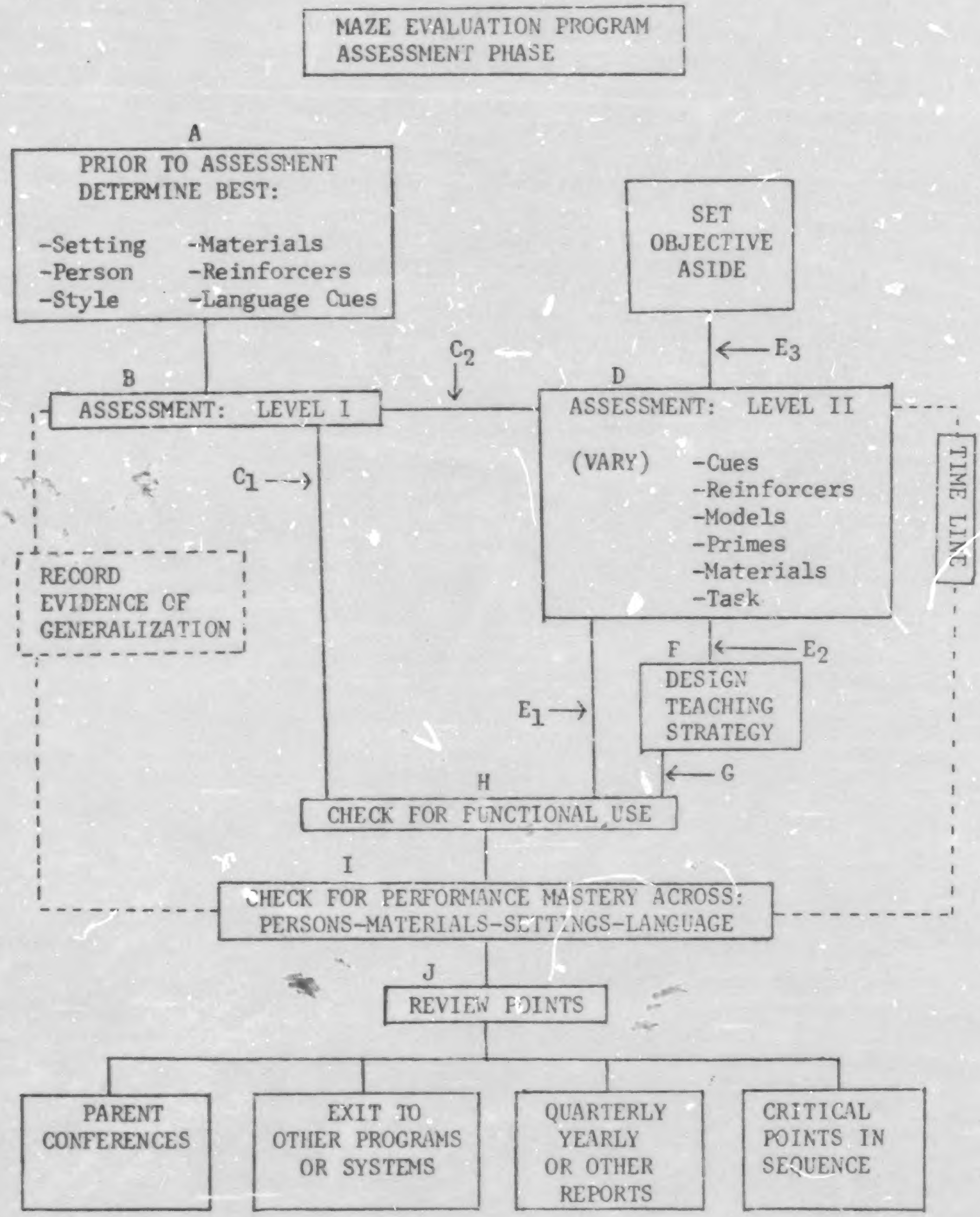
There is no adequate substitute for evaluations which precisely pinpoint students' functioning levels and indicate skills students have mastered and skills they should learn next. In the short run, such evaluations are time consuming and often tedious for both the teacher and the student. However, in the long run thorough evaluations make instruction more efficient because such evaluations make it possible to instruct students only on objectives they have failed and for which they have mastered the prerequisites. In this section we will be concerned primarily with procedures for assessing students' initial skills and skill mastery. Initial skill assessment will be referred to here as baselining. It should be noted that skill mastery need not be evaluated for each objective in the skill sequence but only for selected critical objectives (See Critical Objectives for Skill Mastery, Appendix E).

The assessment model illustrated was developed by teachers and other individuals presently using the math skills sequence. The model illustrated should be appropriate to any skill sequence (e.g., language, social interactions, play, self-care, reading). However, it must be stressed that this model is designed specifically for the teachers using the sequence in the Madison Public Schools. We encourage you to adapt and modify the model to fit your own particular circumstances. That is, we expect that the model illustrated will provide basic principles and notions of how to assess, but these principles and notions will have to be adapted to particular circumstances.

Prior to describing precise procedures for evaluating students we will present an overview of the model. Subsequent to the brief overview detailed evaluation procedures will be described. Figure 2 portrays the evaluation model in a flowchart format.

The model basically consists of seven steps:

Figure 2


MAZE EVALUATION PROGRAM
ASSESSMENT PHASE
A
PRIOR TO ASSESSMENT DETERMINE BEST:
-Setting
-Person
-Style
-Materials
-Reinforcers
-Language Cues
SET OBJECTIVE ASIDE
E3
C2
B
ASSESSMENT: LEVEL I
D
ASSESSMENT: LEVEL II
(VARY)
-Cues
-Reinforcers
-Models
-Primes
-Materials
-Task
TIME LINE
C1
RECORD EVIDENCE OF GENERALIZATION
F
E2
DESIGN TEACHING STRATEGY
E1
G
H
CHECK FOR FUNCTIONAL USE
I
CHECK FOR PERFORMANCE MASTERY ACROSS:
PERSONS-MATERIALS-SETTINGS-LANGUAGE
J
REVIEW POINTS
PARENT CONFERENCES
EXIT TO OTHER PROGRAMS OR SYSTEMS
QUARTERLY YEARLY OR OTHER REPORTS
CRITICAL POINTS IN SEQUENCE

1. Box A: Prior to formally assessing students become familiar and comfortable with them. Informally assess students' skills and what environmental events control their behavior. Use information from this informal assessment to determine optimal assessment conditions.

2. Box B: Assessment Level I - Assess one or more objectives from the skill sequence under optimal but controlled conditions. If students fail the objective, go to Box D (Assessment Level II); if they pass, go to Box H (check for functional use).

3. Box D: Assessment Level II - If students could not perform the skills required by an objective in Level I assessment, assess students' behavior under varied conditions to determine under what conditions (e.g., cues, models, prompts, reinforcement) they can perform the skills. Use information from this assessment to develop an instructional strategy (Box F).

4. Box F: Teach students the target skills.

5. Box H: Assess student mastery of skills. First verify that they can use the skill in the performance of functional tasks which frequently occur (e.g., setting the table, dressing). If they use the skill across functional tasks, formally check skill performance across persons, materials, settings and language cues (Box I).

6. Box I: Verify student performance of skills across persons, materials, settings and language cues.

7. Box J: Review (reassess) student skill performance.

In our judgment the evaluation model has the following attributes:

Validity - The model measures student performance through criterion based objectives under optimal student performance conditions.
Reliability - The model provides for confirmation of student performance across persons, settings, and materials.
Generalizability - The model can be adopted for use across a wide variety of instructional programs.
Ecological - The model insures functional performance of skills across the total of the student's environment.
Conserving - The model allows for an orderly recording of achievement and rate of achievement for every student so that retrieval of information is easily achieved.
Flexible - The model encourages all key figures in the student's environment to be evaluators.

The following narrative attempts to explain the flowchart.

## A. Initial Assessment (A, B, C, D, E, F, G)

### A. Determination of Optimal Assessment Conditions

Our first assumption is that in order to make a valid assessment of students' performance on a given objective, we must provide conditions that will elicit the students' optimal performance. Thus, it is important to become familiar and comfortable with students before you begin formally evaluating them. This will allow you to make the evaluation situation pleasant and nonthreatening, facilitating a valid assessment of the students' skills. With new students you may have to spend several days playing with them and presenting evaluation tasks informally. Through informal assessment, prior to initial assessment Level I, attempt to determine:

1. the optimal setting for administering the assessment (e.g., perhaps the table where students usually perform tasks);
2. the person whom is most likely to elicit optimal performance from the students;
3. materials familiar to the students which should potentially insure optimal performance;
4. potential reinforcers which have in the past elicited good performance;
5. language cues to which the students have demonstrated they can correctly respond;
6. a style of task presentation (e.g., the natural style of the person for whom the students work well) that elicits optimal performance from the students.

### B. Assessment: Level I

Once the potentially optimal conditions have been delineated an assessment of one (or more) selected objectives is administered under controlled conditions but conditions which should elicit optimal performance.

Only administer baseline tests for objectives students have demonstrated they have the prerequisites for through either previous test performance or data from their ongoing math program. Initially, administer baseline tests for the group of skills students appear to fit into. Suggested skill groups are listed in Appendix A.

See Appendix D for information on how to construct and implement initial (Level I and II) tests.

### C. First Decision Point ($C_1$ or $C_2$)

$C_1$ - If the student performs the objective(s) at a predetermined acceptable criterion, the decision ($C_1$) is to move to an assessment of skill mastery (H, I, J) but at a later date.

$C_2$ - If the student does not perform at the acceptable criterion in Level I, the decision ($C_2$) is to move immediately to Level II of assessment (D).

When evaluating a particular skill area (e.g., sets, one-many, rational counting) it may be advantageous to follow this procedure. First test the highest objective in the sequence. If students fail on two consecutive trials, alter the procedure (note on data sheet that you are switching to a Level II procedure) and try to get the response any way you can (e.g., model, prime, change the instructional cue, change the materials, change the reinforcement). If students respond correctly to a Level II procedure, note in the comment section at the bottom of your data sheet what alternatives did and did not produce correct responding. Then move on to the next lowest objective in the sequence. Follow this procedure until you arrive at an objective which students perform correctly when presented at Level I of initial assessment.

## D. Assessment: Level II

If students could not perform skills in Level I assessment, Level II requires the evaluator to assess students' performance under varied conditions (e.g., varied cues, reinforcers, models, primes, materials, tasks) in an attempt to determine under what conditions the student can correctly perform a skill. The students' performance in various conditions should be carefully recorded.

At the end of each initial evaluation session record student data on a daily grid and write up any antidotal comments (See Sample Daily Data Grid, Appendix B). The data depicted on the grid should indicate student performance in the Level I assessment. If students did not perform correctly in the Level I assessment, antidotal comments should summarize student performance of a skill in Level II conditions. When writing up antidotal comments, be specific. That is, precisely specify under what conditions (reinforcement, model, prime, materials, setting, task) students did or did not perform a skill. At the termination of evaluation record student data on the summary grid (See Sample Summary Grid, Appendix C), summarize the antidotal comments and write up an instructional program.

## E. Second Decision Point ($E_1$, $E_2$, or $E_3$)

$E_1$ - If Level II assessment indicates the students can correctly perform a skill across varied conditions, skill mastery may be assessed (H, I, J).

$E_2$ - If students can at least partially perform the skills required under varied conditions, the varied conditions which produced correct performance are incorporated into a teaching strategy (F) for the students.

$E_3$ - If it is found that students cannot perform the skills required by the objective under any of the varied conditions, the decision ($E_3$) is to set the objective aside until there is evidence that students can learn the skills required by the objective.

## F. Teaching Strategy

Whoever is charged with designing students' programs will use the data from the Level II assessment to design and implement an appropriate instructional program.

## G. Third Decision Point (G)

When students demonstrate that they have learned the skills required by the objective through an instructional program skill mastery (H, I, J) is assessed.

## B. Skill Mastery Assessment (H, I, J)

Subsequent to instruction on an objective (F) or acceptable performance in Level I assessment (B) students' skill mastery is assessed (H, I, J).

A skill may be considered mastered only after students can functionally use the skill and perform the skill across people, settings, language cues, tasks and materials which frequently occur. At this point it is necessary to make a distinction between skill mastery and generalization. Generalization may be said to have occurred when after students have been taught to perform a skill across a limited number of people, settings, language cues and tasks without further instruction they perform the skill across additional settings, people, tasks and language cues.

Skill mastery may be but does not have to be the same as skill generalization. Obviously, if after instruction across a limited number of settings, people, functional tasks and language cues students demonstrate skill mastery (generalize the use of skills across additional tasks) they will move rapidly through the skill sequence. However, the possibility exists that some students will not generalize the use of a skill and may have to be taught to perform the skill across all the designated settings, people, functional tasks and language cues before they demonstrate skill mastery.

An essential component of facilitating skill mastery should be the involvement of the students' parents or guardians. That is, through parent conferences parents should help the teacher determine the skills their children are being taught. In addition, parents should be taught how to request and teach their children to use the skills on functional tasks at home. For instance, if students are learning one-to-one correspondence, the children's parents can be requesting them to set the table at home. To facilitate the parents' learning how to teach and require their children to use skills at home periodic workshops can be held where parents and teachers go over the curriculum and procedures for adapting it to functional home-living tasks.

## H. Functional Use

The most critical feature of the model is (H) the assessment of students' functional use of a skill. The teacher with assistance from students' parents or guardians should report what functional tasks students perform a skill across. The report should indicate what cues the performance of tasks (e.g., the task itself, verbal language cues) what the tasks are and the date. That is, both parents and teachers should have a similar data sheet and when they observe students independently perform a skill on a function task they should record the cue, task and setting and date. The following recording format appears to be appropriate.

| | | Task Setting | | |
|---|---|---|---|---|
| Skill | | School | Home | Other |
| Less | tasks<br>cues<br>dates | | | |
| More | tasks<br>cues<br>dates | | | |
| Equivalence | tasks<br>cues<br>dates | | | |
| 1-to-1 Correspondence | tasks<br>cues<br>dates | | | |
| One-Many | tasks<br>cues<br>dates | | | |
| Sorting | tasks<br>cues<br>dates | | | |

If the data indicates that over time a student performs a skill across functional tasks, people, settings and language cues, then a formal test of skill mastery across these dimensions should be implemented (I).

## I. Confirmation of Skill Performance Across People, Settings, Materials and Language Cues

Students are required to demonstrate that they can perform a skill across a variety of selected persons, materials, settings and language cues. Skill mastery is confirmed when several persons have verified that the student can perform a skill across functional tasks and across persons, materials, language cues, and settings. See Appendix F for information on the construction of formal skill mastery tests.

If students demonstrate that they perform a skill across many functional tasks and can perform the skill across people, settings, materials and language cues on the formal skill mastery test, they may be considered to have mastered a skill.

## J. Review Points

Students' mastery of skills should be periodically assessed, reassessed and reported. The assessment, reassessment and reporting of skill mastery should coincide with: a) parent conferences, b) quarter and/or semester periods, and c) the students' mastery of selected critical curriculum objectives. When any one of the events, a, b, c occurs teachers should use their data on students' skill acquisition and if appropriate student performance on a formal evaluation of skill mastery (See Constructing Formal Skill Mastery Tests, Appendix F) to list at least:

1. For what people a student performs the skill;
2. In what settings a student performs the skill;
3. Across what materials a student will perform the skill;
4. In response to what language cues a student will perform the skill;
5. Across what functional tasks a student has demonstrated that he/she can perform the skill.

Student performance data may be summarized on a student evaluation sheet (report card) of the following form.

| Skill | Mastered | Cues | Tasks | Instruct. in Prog. | Cues | Tasks |
|---|---|---|---|---|---|---|
| Less | | | | | | |
| More | | | | X | "Take more"<br>"Give me more"<br>Etc. | Pennies<br>Food at snack<br>Etc. |
| Equivalence | X | "Find equal sets"<br>"Are they equal"<br>"Make them equal"<br>Etc. | Pennies at the store<br>Candy at home<br>Teams at recess<br>Etc. | | | |
| 1-to-1 Correspondence | X | "Are there enough"<br>"Are there too many"<br>"Give each ___ a ___"<br>"Put a ___ on each ___"<br>"Put a ___ next to each ___"<br>Etc. | Setting table at home<br>Passing out food at lunch<br>Choosing teams at recess<br>Etc. | | | |

Comments:

Suggested Home Activities:

This information can then be used for at least the following purposes:

1. Reporting to parents and the school system a student's progress.
2. Assessing a student's rate of progress. That is, how fast a student is progressing through the skill sequence.
3. Evaluating the skill sequence. That is, if data from many students indicates that most students are requiring an unusual amount of instruction to master a skill, it

may be that the skill sequence fails to delineate appropriate prerequisites or instructional procedures necessary for the acquisition of that skill.

4. Evaluating the effectiveness of a teacher's program. If a teacher is moving his/her students through skills at an unusually rapid pace, the teacher may request that his/her instructional program be closely evaluated to determine why it is usually effective so that others may emulate it. Conversely, if a data indicates that students are mastering few or no skills, a teacher may request that a teacher who is experiencing more success help him/her restructure his/her program or request that a curriculum specialist evaluate the program.

## Evidence of Generalization

Concurrent to and following instruction of a skill (F) persons in the students' environment should be aware of the instructional objectives and record (anecdotally) any evidence of generalization of the skill being taught.

## Importance of the Time Line

There is an emphasis on recording rate of student progress through critical objectives. This provides information on student learning rates. Student learning rates are critical in that they can be used to make statements (predictions) concerning a student's learning potential (rates). Information on what skills students can perform and student acquisition rates can be used in the stead of traditional testing (e.g., IQ, achievement tests). We believe this information will be more valid and viable then information gleaned through traditional evaluation.

## Conservation of Accumulated Data

Finally, the model lends itself to the conserving (storing and retrieving) of critical data and potentially provides useful data to all who have use for it (parents, teachers, administrators, psychologists). The chart portrayed below is for use with the evaluation model presented. It is included with the caution that neither it nor the model has been given longitudinal testing in the classroom.

Figure 3

STUDENT ______________ YEAR ______________ PROGRAM ______________

SCHOOL ______________ SEMESTER ______________

| SKILLS & OBJECTIVES | ASSESSMENT: LEVEL I | | ASSESSMENT: LEVEL II | | FUNCTIONAL USE | | | PERFORMANCE MASTERY | | | | | | | | CONFIRMING PERSON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Persons | | Setting | | Mater. | | Lang. | | |
| | ✓ | Date | ✓ | Date | ✓ | ✓ | ✓ | ✓ | Date | ✓ | Date | ✓ | Date | ✓ | Date | |
| 1. IMITATION | | | | | | | | | | | | | | | | |
| MOTOR | | | | | | | | | | | | | | | | |
| VERBAL | | | | | | | | | | | | | | | | |
| 2. SETS | | | | | | | | | | | | | | | | |
| 2. | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | |
| 3. ONE-MANY | | | | | | | | | | | | | | | | |
| 3. | | | | | | | | | | | | | | | | |

ETC.

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## Appendix A

## Suggested Skill Groups for Initial Assessment

### Skill Group 1:

1. Imitation
   - Motoric
   - Verbal
2. Functional Object Use

### Skill Group 2:

1. Sets
   Prerequisite: Motoric Imitation
   Test: Obj. 2

### Skill Group 3:

1. Sets
   Prerequisites: Sets, Obj. 2 (Group 2, 1)
   Test: Obj. 8 (If S passes Obj. 8, test Sets, Obj. 9; if S fails, test Obj. 6)
   Obj. 6
   Obj. 4
2. One-Many
   Prerequisites: Sets, Obj. 2 (Group 2, 1)
   Test: Obj. 3
   Obj. 2
3. One-to-One Correspondence
   Prerequisites: Sets, Obj. 2 (Group 2, 1)
   Test: Obj. 1
4. Rational Counting (Counting Forward)
   Prerequisites: Sets, Obj. 2 (Group 2, 1)
   Test: Obj. 1
   Obj. 2
5. Numeral Recognition (Counting Forward)
   Test: Obj. 1
6. Rote Counting (Counting Forward)
   Test: Obj. 1

### Skill Group 4:

1. Equivalence
   Prerequisites: 1-to-1 Corresponcence, Obj. 1 (Group 2, 3) and/or Rational Counting, Obj. 2 (Group 3, 4)
   Test: Obj. 1
2. More
   Prerequisites: 1-to-1 Correspondence, Obj. 1 (Group 2, 3) and/or Rational Counting, Obj. 2 (Group 3, 4).

3. Rational Counting (Counting Forward)
   Prerequisites: Rational Counting, Obj. 2 (Group 3, 4).
   Test: Obj. 5
   Obj. 4
   Obj. 3
   Optional: Obj. 6
   Obj. 7
4. Rote Counting
   Prerequisite: Rote Counting, Obj. 1 (Group 3, 6)
   Test: Obj. 3 (If S fails, test Obj. 2)
5. 1-to-1 Correspondence Story Problems
   Prerequisites: Rational Counting, Obj. 2 (Group 3, 4)
   Test: Obj. 1

Skill Group 5:

1. Less
   Prerequisites: More, Obj. 1 (Group 4, 2)
   Test: Obj. 2
2. More/Less
   Prerequisites: More, Obj. 1 (Group 4, 2) and Less, Obj. 2 (Group 4, 3)
   Test: Obj. 1
3. Conservation of Number
   Prerequisites: More/Less, Obj. 1 (Group 4, 4) and Equivalence, Obj. 1 (Group [illegible], 1)
   Test: Obj. 6
   Obj. 5
   Obj. 4
   Obj. 3
   Obj. 2
   Obj. 1
4. Matching Numerals to Quantities
   Prerequisites: Numeral Recognition, Obj. 1 (Group 3, 5) and Rational Counting, Obj. 3 (Group 4, 3)
   Test: Obj. 1
5. Matching Quantities to Numerals
   Prerequisites: Numeral Recognition, Obj. 1 (Group 3, 5) and Rational Counting, Obj. 3 (Group 4, 3)
   Test: Obj. 1
6. Ordering Numerals
   Prerequisites: Rational Counting, Obj. 3 (Group 4, 3), Rote Counting, Obj. 2 (Group 4, 4) and Numeral Recognition, Obj. 1 (Group 3, 5)
   Test: Obj. 9 (If S fails Obj. 9, test Obj. 8)
   Obj. 8 (If S fails Obj. 8, test Obj. 7)
   Obj. 7 (If S fails Obj. 7, test Obj. 6)
   Obj. 6 (If S fails Obj. 6, test Obj. 5)
   Obj. 5 (If S fails Obj. 5, test Obj. 4)
   Obj. 4 (If S fails Obj. 4, test Obj. 3)
   Obj. 3 (If S fails Obj. 3, test Obj. 2)
   Obj. 2 (If S fails Obj. 2, test Obj. 1)
   Obj. 1

Skill Group 6:

1. Ordering Quantities
   Prerequisites: Ordering Numerals, Obj. 9 (Group 5, 6)
   Test: Obj. 1
2. Addition With Objects
   Prerequisites: Sets, Obj. 8 (Group 3, 1), Rational Counting, Obj. 1 (Group 4, 3) and Equivalence, Obj. 1 (Group 4, 1)
   Test: Obj. 2
   Obj. 1
3. Numerals and Objects (Addition)
   Prerequisites: Numeral Recognition, Obj. 1 (Group 3, 5), Matching Numerals to Quantities, Obj. 1 (Group 5, 4), Matching Quantities to a Numeral, Obj. 1 (Group 5, 5), and Addition With Objects, Obj. 2 (Group 6, 2)
   Test: Obj. 1
4. Numerals and Lines
   Prerequisites: Numerals and Objects, Obj. 1 (Group 6, 4)
   Test: Obj. 1
5. Numerals
   Prerequisites: Numerals and Lines, Obj. 1 (Group 6, 5)
   Test: Obj. 1
6. Fingers
   Prerequisites: Rote Counting, Obj. 3, 8 (Group 4, 4)
   Test: Obj. 4
   Obj. 3
   Obj. 2
   Obj. 1
7. Addition Facts
   Prerequisites: Rote Count, Obj. 3 (Group 4, 4) and Add Using Numbers and Lines, Obj. 1 (Group 6, 4) and/or Add Using Fingers, Obj. 4 (Group 6, 6)
   Test: Obj. 6
   Obj. 5
   Obj. 4
   Obj. 3
   Obj. 2
   Obj. 1
8. Story Problem X + Y = __
   Prerequisites: Addition With Numerals, Obj. 1 (Group 6, 5) and/or Fingers, Obj. 2 (Group 6, 6)
   Test. Obj. 5
   Obj. 4
   Obj. 3
   Obj. 2
   Obj. 1
9. Story Problem X + __ = Y
   Prerequisites: Addition With Fingers, Obj. 2 (Group 6, 6)
   Test: Obj. 5
   Obj. 4
   Obj. 3
   Obj. 2
   Obj. 1

## Appendix B

## Sample Daily Level I and II Data Grids

There is a sample grid for each skill group. It is anticipated that a student may be evaluated on skills from more then one skill grouping in a single day. If this occurs, record the data on the appropriate grid under the appropriate day.

If students have four out of five correct trials (80%) on any objective, consider administering a skill mastery test. If students have two errors on any objective in Level I, test them on the next lowest objective for that area until their skill level is determined. To reiterate, start testing students in the skill group past performance data indicates that they belong.

## Sample Daily Baseline Data Grid

**Group 1 and Group 2**

LI = Level I  LII = Level II

| Skill Area | Day 1 Date______ | | | Day 2 Date______ | | | Day 3 Date______ | | | Day 4 Date______ | | | Day 5 Date______ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LI Cor | Er | LII | LI Cor | Er | LII | LI Cor | Er | LII | LI Cor | Er | LII | LI Cor | Er | LII |
| **Group 1** | | | | | | | | | | | | | | | |
| Motor Imitation | | | | | | | | | | | | | | | |
| Verbal Imitation | | | | | | | | | | | | | | | |
| Whole Word | | | | | | | | | | | | | | | |
| Isol. Sounds | | | | | | | | | | | | | | | |
| Func. Obj. Use | | | | | | | | | | | | | | | |
| **Group 2** | | | | | | | | | | | | | | | |
| Sets Obj. 2 | | | | | | | | | | | | | | | |

Comments:

## Sample Daily Baseline Data Grid

Group 3

LI = Level I    LII = Level II

| Skill Area | Day 1 Date______ | | | Day 2 Date______ | | | Day 3 Date______ | | | Day 4 Date______ | | | Day 5 Date______ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LI | | LII | LI | | LII | LI | | LII | LI | | LII | LI | | LII |
| | Cor | Er | | Cor | Er | | Cor | Er | | Cor | Er | | Cor | Er | |
| Group 3<br>Set<br>Obj. 9<br>Obj. 8<br>Obj. 6<br>Obj. 4 | | | | | | | | | | | | | | | |
| One-Many<br>Obj. 3<br>Obj. 2 | | | | | | | | | | | | | | | |
| One-to-One<br>Obj. 1 | | | | | | | | | | | | | | | |
| Rational Counting<br>Obj. 1<br>Obj. 2 | | | | | | | | | | | | | | | |
| Numeral Recog.<br>Obj. 1 | | | | | | | | | | | | | | | |
| Rote Counting<br>Obj. 1 | | | | | | | | | | | | | | | |

Comments:

## Sample Daily Baseline Data Grid

### Group 4

LI = Level I      LII = Level II

| Skill Area | Day 1 Date______ | | | Day 2 Date______ | | | Day 3 Date______ | | | Day 4 Date______ | | | Day 5 Date______ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LI | | LII | LI | | LII | LI | | LII | LI | | LII | LI | | LII |
| | Cor | Er | | Cor | Er | | Cor | Er | | Cor | Er | | Cor. | Er | |
| **Group 4**<br>Equiv.<br>Obj. 1 | | | | | | | | | | | | | | | |
| More<br>Obj. 1 | | | | | | | | | | | | | | | |
| Rational Counting<br>Obj. 5<br>Obj. 4<br>Obj. 3 | | | | | | | | | | | | | | | |
| Rote Counting<br>Obj. 3<br>Obj. 2 | | | | | | | | | | | | | | | |
| 1-to-1 Corre. Story Prob.<br>Obj. 1 | | | | | | | | | | | | | | | |

Comments:

## Sample Daily Baseline Data Grid

Group 5

LI = Level I LII = Level II

| Skill Area | Day 1 Date______ | | | Day 2 Date______ | | | Day 3 Date______ | | | Day 4 Date______ | | | Day 5 Date______ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LI | | LII | LI | | LII | LI | | LII | LI | | LII | LI | | LII |
| | Cor | Er | | Cor | Er | | Cor | Er | | Cor | Er | | Cor | Er | |
| Group 5<br>Less<br>Obj. 2 | | | | | | | | | | | | | | | |
| More/Less<br>Obj. 1 | | | | | | | | | | | | | | | |
| Con. of Number<br>Obj. 6<br>Obj. 5<br>Obj. 4<br>Obj. 3<br>Obj. 2<br>Obj. 1 | | | | | | | | | | | | | | | |
| Match Num. to Qu.<br>Obj. 1 | | | | | | | | | | | | | | | |
| Match Qu. to Num.<br>Obj. 1 | | | | | | | | | | | | | | | |
| Order Numerals<br>Obj. 9<br>Obj. 8<br>Obj. 7<br>Obj. 6<br>Obj. 5<br>Obj. 4<br>Obj. 3<br>Obj. 2<br>Obj. 1 | | | | | | | | | | | | | | | |

Comments:

## Sample Daily Baseline Data Grid

Group 6

LI = Level I LII = Level II

| Skill Area | Day 1 Date____ | | | Day 2 Date____ | | | Day 3 Date____ | | | Day 4 Date____ | | | Day 5 Date____ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LI | | LII | LI | | LII | LI | | LII | LI | | LII | LI | | LII |
| | Cor | Er | | Cor | Er | | Cor | Er | | Cor | Er | | Cor | Er | |
| Group 6 | | | | | | | | | | | | | | | |
| Or. Qu. | | | | | | | | | | | | | | | |
| Obj. 1 | | | | | | | | | | | | | | | |
| Ad. Obj. | | | | | | | | | | | | | | | |
| Obj. 2 | | | | | | | | | | | | | | | |
| Obj. 1 | | | | | | | | | | | | | | | |
| Ad. Num. & Obj. | | | | | | | | | | | | | | | |
| Obj. 1 | | | | | | | | | | | | | | | |
| Ad. Num. & Lines | | | | | | | | | | | | | | | |
| Obj. 1 | | | | | | | | | | | | | | | |
| Ad. Fin. | | | | | | | | | | | | | | | |
| Obj. 4 | | | | | | | | | | | | | | | |
| Obj. 3 | | | | | | | | | | | | | | | |
| Obj. 2 | | | | | | | | | | | | | | | |
| Obj. 1 | | | | | | | | | | | | | | | |
| Ad. Fac. | | | | | | | | | | | | | | | |
| Obj. 6 | | | | | | | | | | | | | | | |
| Obj. 5 | | | | | | | | | | | | | | | |
| Obj. 4 | | | | | | | | | | | | | | | |
| Obj. 3 | | | | | | | | | | | | | | | |
| Obj. 2 | | | | | | | | | | | | | | | |
| Obj. 1 | | | | | | | | | | | | | | | |
| X+Y=__ | | | | | | | | | | | | | | | |
| Obj. 5 | | | | | | | | | | | | | | | |
| Obj. 4 | | | | | | | | | | | | | | | |
| Obj. 3 | | | | | | | | | | | | | | | |
| Obj. 2 | | | | | | | | | | | | | | | |
| Obj. 1 | | | | | | | | | | | | | | | |
| X+__=Y | | | | | | | | | | | | | | | |
| Obj. 5 | | | | | | | | | | | | | | | |
| Obj. 4 | | | | | | | | | | | | | | | |
| Obj. 3 | | | | | | | | | | | | | | | |
| Obj. 2 | | | | | | | | | | | | | | | |
| Obj. 1 | | | | | | | | | | | | | | | |

Comments:

## Appendix C

### Sample Summary Grid

+ = Level I Assessment
- = Failed Level I
I = Instruction in Progress
++ = Skill Mastery
-- = Failed Skill Mastery

Motor Imitation
Verbal Imitation
  Whole Word
  Isolated Sounds
Functional Obj. Use
Sets
  Obj. 9
  Obj. 8
  Obj. 6
  Obj. 4
  Obj. 2
One-Many
  Obj. 3
  Obj. 2
Rational Counting
  Obj. 5
  Obj. 4
  Obj. 3
  Obj. 2
  Obj. 1
Numeral Recognition
  Obj. 1
Rote Counting
  Obj. 3
  Obj. 2
  Obj. 1
Equivalence
  Obj. 1
More
  Obj. 1
Less
  Obj. 2
More/Less
  Obj. 1
Con. of Number
  Obj. 6
  Obj. 5
  Obj. 4
  Obj. 3
  Obj. 2
  Obj. 1

Match Numeral to Quantity
  Obj. 1
Match Quantity to Numeral
  Obj. 1
Order Numerals
  Obj. 9
  Obj. 8
  Obj. 7
  Obj. 6
  Obj. 5
  Obj. 4
  Obj. 3
  Obj. 2
  Obj. 1
Order Quantities
  Obj. 1
Add. Objects
  Obj. 2
  Obj. 1
Add Numbers & Objects
  Obj. 1
Add Numbers & Lines
  Obj. 1
Add Numbers
  Obj. 1
Add Fingers
  Obj. 4
  Obj. 3
  Obj. 2
  Obj. 1
X + Y = __
  Obj. 5
  Obj. 4
  Obj. 3
  Obj. 2
  Obj. 1
X + __ = Y
  Obj. 5
  Obj. 4
  Obj. 3
  Obj. 2
  Obj. 1

Comments:

## Appendix D

### Implementing and Constructing Initial Assessment Tests

Use of the following procedures should help optimize students' skill performance during evaluation.

a. Arrange for an individual student who students perform well with to administer the evaluation.

b. Administer the evaluation in a setting in which students have demonstrated they perform well.

c. When appropriate arrange for students to demonstrate knowledge of skills through responses they will readily perform. For example, if you are assessing students' knowledge of the concept of ball, you could hold up a ball and ask students to label it. However, for students who are not good labelers you could present a nonverbal comprehension task. That is, you could present a ball and a cup and request the student to give you the ball. Similarly, if students were more familiar with being asked to "pick up," "touch," or "show me," they could be requested to "pick up," "touch" or "show" instead of "give." Thus, if you are assessing two students' knowledge of the concept ball, your language cue for one student could be "Give me ball" and for the other it could be "Show me ball." Request verbal responses from verbal students. If they fail on an objective, request a nonverbal response. Request nonverbal responses from nonverbal students.

d. Use evaluation materials which are familiar to the students. For instance, in assessing students on the concept of ball use a ball students play with during free time. When appropriate and possible, a check of students' nonverbal comprehension of materials to be used in evaluation should be made before administering an assessment. That is, if you are going to assess students' knowledge of the concepts of one-many through having students give you one or many cups, determine if students can nonverbally indicate which objects are cups before using cups in the one-many task. Do not use materials that will distract students from performing the skills. For example, in the one-many task students may have nonverbal comprehension of M & Ms and know the concept of one-many; however, they may eat all the M & Ms instead of "giving you" or "touching" one or many.

Determine the people, settings, response requirements and task materials to be used in assessment through: consulting students, parents, reviewing students' previous performance data, carefully observing students in structured and free play situations, and testing student nonverbal comprehension of objects that could be used in assessment.

Plan to spend about forty-five minutes a day for five days evaluating student functioning level in one skill area (e.g., math, reading, language). However, evaluation should not be limited to this forty-five minute block. Throughout the day you should arrange situations to assess if students can use skills being tested to perform functional tasks. For example, in assessing one-many students could be asked to bring one/many crayons to art.

Only evaluate one or two skill areas at a time. That is, if the students' math skills and motor skills are evaluated the first week of school, their language skills should typically not be evaluated until the second. Evaluations are tedious and overevaluating can lead to fatigue, boredom and compliance problems.

Break the evaluation session into small blocks of time and vary the evaluation activity from block to block. For example, in evaluating math the skill evaluated could be varied from block to block as follows:

Day 1

Time Start: 8:45

| Time | Evaluate |
|---|---|
| 8:45 - 9:00 | Sets - Obj. 2 |
| 9:00 - 9:05 | Short Break |
| 9:05 - 9:20 | One-Many - Obj. 3 |
| 9:20 - 9:30 | Sets - Obj. 8 |
| 9:30 - 9:35 | Break |
| 9:35 - 9:45 | One-to-One Correspondence - Obj. 1 |
| 9:45 -10:00 | Numeral Recognition - Obj. 1 |

Day 2

| Time | Evaluate |
|---|---|
| 8:45 - 8:55 | Rational Counting - Obj. 2 |
| 8:55 - 9:05 | One-to-One Correspondence - Obj. 1 |
| 9:05 - 9:10 | Break |
| 9:10 - 9:20 | Rote Counting - Obj. 1 |
| 9:20 - 9:30 | Rational Counting - Obj. 1 |
| 9:30 - 9:40 | Numeral Recognition - Obj. 1 |
| 9:40 - 9:50 | Sets - Obj. 6 |
| 9:50 -10:00 | Sets - Obj. 4 |

Day 3

Etc.

Generally when selecting skills to evaluate, it is beneficial to mix skills from the following three categories:

1. General number skills
    - a. Label numbers in order and in random order when numbers are presented on number cards and number boards
    - b. Writing numbers
    - c. Rote counting
    - d. Ordering numbers

2. Rational counting
    - a. Count a given array
    - b. Count out a specified number from an array
    - c. Match a numeral to a quantity
    - d. Match a quantity to a numeral
    - e. Order quantities

3. Cognitive number skills
    - a. One-many
    - b. One-to-one correspondence
    - c. Equivalence
    - d. More and less

Students may initially be evaluated on the following skills: sets, one-many, one-to-one correspondence, rational counting. rote counting, and numeral recognition. If students can perform some of these skills, test them on the skills they are the prerequisites to such as: equivalence, more-less, matching a quantity to a numeral, matching a numeral to a quantity, ordering numerals. If students perform these skills, test them on the skills they are the prerequisites to such as: addition.

## Constructing Initial (Level I & II) Tests

Before designing a test one should carefully consider for what purpose the results will be used. Then the test should be constructed to fit the use. It is inefficient to collect more or less data than will actually be used.

Let's say you want to construct a test to assess student performance on Sets, Obj. 2, in the math skills sequence. The first step in developing the test should be to determine what responses students have to make to pass the test. The objective states:

> "Given a group of objects whose members differ along at least one dimension, the student should sort the objects into separate sets when the teacher points and says, "Make a set of (cups) and a set of (plates). Put the (cups) here and the (plates) here."

Instructional Sequence: The student should be able to sort into separate sets:
- a. objects
- b. flannel items

Verbal Operation: The same procedure as in Objective 2 is followed. After the student correctly sorts the objects the teacher points and says, "What is this set?" and the student should label the set (e.g., "blocks" or "bears").

The objective essentially requires that students discriminate between objects (e.g., plates and cups) and associate labels with the objects. That is, students have to sort objects into specified sets when the sets are designated by a label (i.e., "Put the cups here and the plates here."). Nonverbal students must demonstrate they can associate labels with the objects by sorting the objects into designated sets. Verbal students must sort the objects into separate sets and then label the sets.

The basic guidelines to follow when designing a test are:

1. Delineate a system for scoring each student response of concern. In this case for nonverbal students only the correctness of the sorting response has to be scored. For the verbal student the correctness of the sorting response and the labeling response must be scored. If the purpose of the test was merely to determine whether or not a student could perform the skill, the following data collection format would be appropriate.

   T = Trial + = Correct – = Error S = Student

| | | Nonverbal Response | | | | | Verbal Response | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sorting | | | | | Labeling | | | | |
| Student | Task Materials | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| $\underline{S_1}$ | blocks & bears | + | + | + | + | + | – | – | – | – | – |

   However, if the purpose of the test is to develop an instructional program tailored to the skills the student can and cannot perform, the information derived from the above format is not sufficient. At least two additional bits of information are helpful in developing an instructional program: 1) the specific type of errors students make; and 2) under what conditions students can perform the skills. This brings us to guidelines two and three.

2. When appropriate, use a data collection format which allows a precise determination of the type of error students make. The above format allows the evaluator to determine whether students made a sorting or labeling error. However, whenever appropriate error responses should also be broken down into their smallest component parts. In this example, students could have made two types of labeling errors: incorrectly labeling the block or incorrectly labeling the bear. In the following data collection format the type of error can be denoted.

| | | Nonverbal Response | | | Verbal Response | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Sorting | | | Labeling | | | | | |
| Student | Task Materials | T1 | T2 | T3 | T1 | | T2 | | T3 | |
| | | | | | block | bear | block | bear | block | bear |
| $\underline{S}_1$ | blocks & bears | + | + | + | + | – | + | – | + | – |

| Correct Responses: | 6/9 |
|---|---|
| Sorting | 3/3 |
| Labeling | 3/6 |

| Error Responses: | 3/9 |
|---|---|
| Sorting | 0/3 |
| Labeling | 3/6 |
| Blocks | 0/3 |
| Bears | 3/3 |

This collection format allows the evaluator to analyze the error pattern and determine that the student only needs instruction on labeling bears. Obviously, a data collection format which allows the coding of every potential type of error gives the evaluator optimal information. However, in many cases the types of potential errors are numerous and the data collection and data sheets would be quite cumbersome. Thus, it may be practical to note the type of error in an error comment section of the sheet.

As described previously cues to respond and response requirements may vary from student to student. A problem with the above format is that it does not allow the evaluator to score what cues to respond were presented to individual students. The following data collection format may be appropriate for denoting types of errors and cues to respond.

Objective____________________ Date____________________
Evaluator____________________ Setting____________________

Cues to Respond:
- a. "Put the _____ here and the _____ here."
- b. "Place the _____ here and the _____ here."
- c. "Pile the _____ here and the _____ here."
- d. Teacher points to object(s) and asks, "What are these?"

| | | Nonverbal Response | | | | | Verbal Response | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Materials and Cues | Trials | | | | | Trials | | | | | Type of Error |
| | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| $\underline{S}_1$ | blocks & bears<br>Cues:<br>a and d | | | | | | | | | | | |
| $\underline{S}_2$ | cups & spoons<br>Cues:<br>b and d | | | | | | | | | | | |

This format appears adequate. However, it does not indicate under what conditions students can perform the correct response if they failed the Level I initial assessment.

3. When appropriate, use a data collection format which allows the determination of under what conditions students can perform skills they failed in the Level I administration of initial assessment. In the system described here, after students make at least two errors given the baseline test under Level I administration conditions the evaluator should switch to a Level II evaluation procedure and attempt to get the correct response any way possible (e.g., model, prime, change the instructional cue, change the materials, change the reinforcer). If students respond correctly to a Level II procedure, note in a comment section at the bottom of the data sheet which conditions did and did not produce correct responding. The alternatives which procedures correct responding should give a teacher a notion of what type of instructional programs and specific instructional procedures are appropriate for teaching students the skill. The only change from the data collection format suggested in "2" is the addition of a comment section at the bottom of the data sheet.

4. Students often base their responses on irrelevant dimensions of a task (e.g., the position of the objects, color of objects, subtle teacher cues). Testing should be arranged to insure that students have to base their responses on relevant task dimensions. Becker, Engelmann and Thomas (1971) suggest to insure essential task characteristics control students' responding tasks should be chosen which allow the teacher to:

   a. Present a set of instances and not instances of the concept (e.g., instances of cups and not instances of cups should be presented).

   b. Construct instances of the concept such that they all have essential concept characteristics and construct not instances such that they have none or only some of the essential characteristics.

   c. Frequently vary the nonessential characteristics of the instances and not instances to insure that the students have to respond only to essential characteristics (e.g., in presenting cups the size, color, texture and position of instances and not instances of cups should be varied).

Sample initial assessment data sheets are provided in Appendix G. If students perform the skills required by an objective correctly on four out of five presentations of initial assessment in Level I conditions and if the objective is a critical objective (See Critical Objectives, Appendix E), administer skill mastery assessment at a later date. However, if the students fail an objective in Level I conditions and the objective is one above an objective they passed in Level I conditions, the information from the Level II assessment of the objective should be used to delineate potentially viable instructional procedures.

## Appendix E

## Critical Objectives for Which Skill Mastery Should be Assessed and Reported

1. Imitation
   - Motor
   - Verbal
2. Sets
   - Obj. 2
   - Obj. 8
   - Obj. 9
3. One-Many
   - Obj. 3
4. One-to-One Correspondence
   - Obj. 1
5. Equivalence
   - Obj. 1
6. More/Less (More and Less)
   - Obj. 1
7. Conservation of Number (More and Less)
   - Obj. 2
   - Obj. 4
   - Obj. 6
8. Rational Counting
   - Obj. 3, 10, 15, 20, 3, h
   - Obj. 4
9. Rote Counting
   - Obj. 3
10. Numeral Recognition
    - Obj. 1
11. Matching Numerals to Quantities
    - Obj. 1
12. Matching Quantities to Numerals
    - Obj. 1
13. Ordering Numerals
    - Obj. 5
    - Obj. 9
14. Ordering Quantities
    - Obj. 1
15. Addition Numeral & Objects
    - Obj. 1
16. Addition Fingers
    - Obj. 4
17. 1-to-1 Correspondence
    - Story Problems
      - Obj. 1
18. X + Y = __
    - Story Problems
      - Obj. 4
19. X + __ = Y
    - Story Problems
      - Obj. 4

## Appendix F

## Constructing Formal Skill Mastery Tests

The purpose of the formal skill mastery tests is to confirm that students can perform skills across functional tasks, settings, people, task materials and language cues which frequently occur. The following procedure may be appropriate. First, determine the task materials, settings, people and language cues students should perform the skill across. When a student correctly performs a critical objective in a Level I initial assessment or otherwise demonstrates skill performance across functional tasks, people, settings and language cues (as in H of the evaluation model) administer formal skill mastery tests. On skill mastery tests only vary the item being tested (people, settings, materials, language cues). That is, if performance of skills across task materials is being tested, keep everything the same (i.e., people, setting and language cues) but the materials.

### Sample Skill Mastery Test Data Sheet

Objective ____________________ Date ________________________

Evaluator ____________________ Setting _____________________

Cues to respond:

a. "Put the _____ here and the _____ here."
b. "Place the _____ here and the _____ here."
c. "Pile the _____ here and the _____ here."
d. Teacher point to object and asks, "What are these?"

Across Materials

| $S_1$ | Cues | Materials | Cor. of Resp. | Type of Error |
|---|---|---|---|---|
| Trial 1 | a | red blocks<br>green bears | | |
| Trial 2 | a | big bears<br>little blocks | | |
| Trial 3 | a | green bears<br>red blocks | | |
| Trial 4 | a | big blocks<br>little bears | | |
| Trial 5 | a | red blocks<br>green bears | | |

Comments:

If performance across people is being tested, keep everything constant (i.e., task materials, settings, and language cues) except the evaluator.

Across People

$T_2$ = Aide     $T_3$ = Method's Student

| Student | Tester | Cues | Materials | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|
| Trial 1 | $T_2$ | a | block-bear | | |
| Trial 2 | $T_3$ | a | block-bear | | |
| Trial 3 | $T_3$ | a | block-bear | | |
| Trial 4 | $T_2$ | a | block-bear | | |
| Trial 5 | $T_3$ | a | block-bear | | |

Comments:

If performance across settings is being tested, keep everything constant (i.e., task materials, people, and language cues) except the setting.

Across Settings

$St_1$ = Library     $St_2$ = Kitchen Area

| Student | Setting | Cues | Materials | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|
| Trial 1 | $St_1$ | a | block-bear | | |
| Trial 2 | $St_1$ | a | block-bear | | |
| Trial 3 | $St_2$ | a | block-bear | | |
| Trial 4 | $St_2$ | a | block-bear | | |
| Trial 5 | $St_1$ | a | block-bear | | |

Comments:

If a purpose of the evaluation is to determine if the student can perform a skill across language cues to respond, then two types of language cues could be presented.

a. A series of different verbal language cues to respond which require topographically similar responses (e.g., "Put the (blocks) here and the (bears) here," "Place the (blocks) here and the (bears) here," "Pile the (blocks) here and the (bears) here"). In this case students are not necessarily required to differentially respond to the individual components (nouns, verbs) of the language cues. However, in most daily human situations individuals are required to differentially respond to the individual components of verbal language cues (e.g., give me cup, touch cup, take cup). That is, the listener is required to discriminate the individual components (e.g., noun-verb: take cup, touch cup, give me cup) of cues one after another. This brings us to a second type of language cue presentation.

b. A series of different verbal language cues which requires students to differentially respond (make topographically different responses) to the individual components of the language cues (e.g., take cup, touch cup, give me cup). Option 'b' is the most appropriate for assessing performance across verbal language cues since it is the arrangement which most accurately reflects the ordinary human situation. If performance across language cues is being assessed, keep everything constant (i.e., task materials, people, and setting) except the verbal language cues.

Across Verbal Language Cues

T = Touch bear/block
G = Give me bear/block
L = Label "What is this" bear/block

| Student | Language Cue | Materials | Cor. of Resp. | Type of Error |
|---|---|---|---|---|
| Trial 1 | T | block-bear | | |
| Trial 2 | G | block-bear | | |
| Trial 3 | L | block-bear | | |
| Trial 4 | G | block-bear | | |
| Trial 5 | T | block-bear | | |

Comments:

Sample mastery skill test data sheets are provided in Appendix H.

## Sample Summary Grid for Skill Mastery

I = Instruction in Progress - = Failed + = Mastered

| Skill Area | People | Lan. Cue | Mat. | Set. |
|---|---|---|---|---|
| Imitation | | | | |
| Motor | | | | |
| Verbal | | | | |
| Sets | | | | |
| Obj. 2 | | | | |
| Obj. 8 | | | | |
| Obj. 9 | | | | |
| One-Many | | | | |
| Obj. 3 | | | | |
| One-to-One Cor. | | | | |
| Obj. 1 | | | | |
| Equiv. | | | | |
| Obj. 1 | | | | |
| More/Less | | | | |
| Obj. 1 | | | | |
| Con. of Num. | | | | |
| Obj. 2 | | | | |
| Obj. 4 | | | | |
| Obj. 6 | | | | |
| Rat. Ct. | | | | |
| Obj. 4 | | | | |
| Obj. 5 | | | | |
| Rote Ct. | | | | |
| Obj. 3 | | | | |
| Num. Rec. | | | | |
| Obj. 1 | | | | |
| Mat. Num. to Quan. | | | | |
| Obj. 1 | | | | |
| Mat. Quan. to Num. | | | | |
| Obj. 1 | | | | |
| Ord. Num. | | | | |
| Obj. 5 | | | | |
| Obj. 9 | | | | |
| Ord. Quan. | | | | |
| Obj. 1 | | | | |
| Add Num. & Obj. | | | | |
| Obj. 1 | | | | |
| Add Fin. | | | | |
| Obj. 4 | | | | |
| 1-to-1 Cor. | | | | |
| Story Prob. | | | | |
| Obj. 1 | | | | |
| X+Y=___ Story Prob. | | | | |
| Obj. 4 | | | | |
| X+___=Y Story Prob. | | | | |
| Obj. 4 | | | | |

## Appendix G

## Sample Baseline Data Sheets

Several sample baseline data sheets are provided. In most cases these sheets will not be applicable to a particular situation or student without modification. That is, you should use cues, materials, settings, etc. appropriate to your students. It is hoped that these sample sheets will help readers devise their own data collection systems and formats. Do not use these sheets without carefully reading the previous sections on initial skill assessment and construction of tests. As previously articulated when initially assessing students use language cues, materials, settings and evaluators which you think will facilitate the student performing optimally.

### Baseline Data Sheet

### Sets

Objective ______2______ Date ____________
Evaluator ____________ Setting ____________

Cues to respond:
a. "Put the _____ here and the _____ here."
b. "Set the _____ here and the _____ here."
c. Teacher points to objects and asks, "What are these?"

| | | | Nonverbal Response | | | | | Verbal Response | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Trials | | | | | Trials | | | | | |
| | Materials & Cues | # of Obj. in Set | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | Type of Error |
| $S_1$ | crayons & blocks<br>Cues: a & c | 2 | | | | | | | | | | | |
| $S_2$ | cups & spoons<br>Cues: b & c | 2 | | | | | | | | | | | |

Comments:

# Baseline Data Sheet

## Sets

Objective 8 Date ____________
Evaluator ____________ Setting ____________

Cues to respond:

a. "Put the _____ and _____ here."
b. "Place the _____ and _____ here."
c. Teacher points to objects and asks, "What are these?"

| | | Nonverbal Response | | | | | Verbal Response | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Requested Set | Trials | | | | | Trials | | | | | Type of Error |
| Materials & Cues | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | |
| S1 cup, napkin, spoon, dish<br>Cues: a & c | cup & spoon | | | | | | | | | | | |
| S2 block, bear, crayon, bead<br>Cues: a & c | block & bear | | | | | | | | | | | |

Comments:

## Equivalence

Objective ____________________ Date ____________________
Evaluator ____________________ Setting ____________________

Cues to respond:
- a. Make your set equal to mine.
- b. How many _____ in my set?
- c. How many _____ do you need?
- d. Do you have enough _____?
- e. Are the sets equal?
- f. Are there enough?
- g. Is your set equal to mine?
- h. How can you tell?
- i. Put the equal signs between the two equal sets.

Materials:
(choose optimal one for each student)
1. blocks
2. bears
3. chips
4. bottle caps
5. cards

Responses necessary to complete task:
1. Counts T's set correctly (if have rational counting skills)
2. Puts out set equal to T's set
3. Matches sets using 1-to-1 correspondence
4. Answers that sets are equal (i.e., verbal)
5. Places equal sign between 2 sets

| Student 1 | Cues | Material | # Obj. in T Set | Set Arrange. | Responses Correct | Type Error | Comment |
|---|---|---|---|---|---|---|---|
| Trial 1 | a | 4 | 3 | vertical | 1__ 2__ 3__<br>4__ 5__ | | |
| Trial 2 | a | 4 | 4 | vertical | 1__ 2__ 3__<br>4__ 5__ | | |
| Trial 3 | a | 4 | 2 | vertical | 1__ 2__ 3__<br>4__ 5__ | | |

## Conservation of Number

Objective ____________________ Date ____________________
Evaluator ____________________ Setting ____________________

Set Arrangement: Always spread out one set
Set Equivalence: Equivalent = E
Nonequivalent = NE
# of objects in sets: Always 5-5 or 5-4

Cues to respond:
- a. Are the sets equal?
- b. Do the sets have a different number?
- c. Does one set have more?
- Etc.

| | | | Nonverbal Response | | | | | Verbal Response | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Student | Cue | Task Materials & Set Equiv. | $T_1$ E | $T_2$ NE | $T_3$ E | $T_4$ E | $T_5$ NE | $T_1$ E | $T_2$ E | $T_3$ NE | $T_4$ E | $T_5$ NE |
| $\underline{S}_1$ | a | cups & saucers | | | | | | | | | | |
| $\underline{S}_2$ | a | cups & saucers | | | | | | | | | | |

Comments:

## Appendix H

## Sample Skill Mastery Data Sheets

Several sample skill mastery data sheets are provided. These sheets will not be applicable to a particular situation or student without modification. That is, you should use cues, materials, settings, etc. relevant to your students. It is hoped that these data sheets provide a model for devising your own data collection system and format. Do not use these sheets without carefully reading the previous section on skill mastery assessment and constructing skill mastery tests.

### Sample Skill Mastery Data Sheet

### A. Sets

Objective 2 Date ____________

Evaluator ____________ Setting ____________

### Across Materials

Cues to respond:

a. "Set the _____ here and the _____ here."

Materials:

1. dishes and cups
2. blocks and bears
3. spoons and crayons
4. paints and brushes
5. flannel birds and trees

| Student 1 | Cues | Materials | # of Obj. in Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|
| Trial 1 | a | 1 | 2 | | |
| Trial 2 | a | 2 | 5 | | |
| Trial 3 | a | 3 | 4 | | |
| Trial 4 | a | 4 | 6 | | |
| Trial 5 | a | 5 | 3 | | |

Comments:

## Across Settings

Settings:
1. Work table
2. Kitchen area
3. Play area
4. Hall

| Student 1 | Setting | Cues | Materials | # of Obj. in Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | dishes & cup | 2 | | |
| Trial 2 | 2 | a | dishes & cup | 5 | | |
| Trial 3 | 3 | a | dishes & cup | 4 | | |
| Trial 4 | 4 | a | dishes & cup | 3 | | |
| Trial 5 | 2 | a | dishes & cup | 6 | | |

Comments:

## Across People

People:
1. Aide
2. Student teacher
3. Teacher

| Student 1 | People | Cues | Materials | # of Obj. in Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | dishes & cup | 2 | | |
| Trial 2 | 2 | a | dishes & cup | 5 | | |
| Trial 3 | 3 | a | dishes & cup | 4 | | |
| Trial 4 | 1 | a | dishes & cup | 3 | | |
| Trial 5 | 3 | a | dishes & cup | 6 | | |

Comments:

## Across Language Cues

Response cues:

1. "Set the _____ here and the _____ here."
2. "Put the _____ here and the _____ here."
3. "Place the _____ here and the _____ here."
4. Teacher points to objects and asks, "What are these?"

| Student 1 | Cues | Materials | # of Obj. in Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|
| Trial 1 | 1 | dishes & cup | 2 | | |
| Trial 2 | 2 | dishes & cup | 5 | | |
| Trial 3 | 3 | dishes & cup | 4 | | |
| Trial 4 | 4 | dishes & cup | 3 | | |
| Trial 5 | 4 | dishes & cup | 6 | | |

Comments:

## Sample Skill Mastery Data Sheet

### B. Sets

Objective 8

Date _____

Evaluator _____

Setting _____

## Across Materials

Cues to respond:

a. "Set the _____ and the _____ here."

Materials:

1. dish, cup, napkin, spoon
2. crayon, block, toothbrush, cup
3. pencil, bead, comb, brush
4. brush, dish, fork, mitten
5. scissors, car, apple, banana

| Student 1 | Cues | Materials | Requested Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|
| Trial 1 | a | 1 | dish, cup | | |
| Trial 2 | a | 2 | crayon, toothbrush | | |
| Trial 3 | a | 3 | comb, brush | | |
| Trial 4 | a | 4 | fork, mitten | | |
| Trial 5 | a | 5 | car, apple | | |

Comments:

## Across Settings

Setting:
1. Work table
2. Play area
3. Kitchen area

| Student 1 | Setting | Cues | Materials | Requested Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | dish, cup<br>napkin, spoon | dish<br>cup | | |
| Trial 2 | 2 | a | dish, cup<br>napkin, spoon | napkin<br>spoon | | |
| Trial 3 | 3 | a | dish, cup<br>napkin, spoon | cup<br>spoon | | |
| Trial 4 | 1 | a | dish, cup<br>napkin, spoon | dish<br>napkin | | |
| Trial 5 | 2 | a | dish, cup<br>napkin, spoon | cup<br>napkin | | |

Coments:

## Across People

People:
1. Aide
2. Student teacher
3. Teacher

| Student 1 | People | Cues | Materials | Requested Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | dish, cup<br>napkin, spoon | dish<br>cup | | |
| Trial 2 | 2 | a | dish, cup<br>napkin, spoon | napkin<br>spoon | | |
| Trial 3 | 3 | a | dish, cup<br>napkin, spoon | cup<br>spoon | | |
| Trial 4 | 1 | a | dish, cup<br>napkin, spoon | dish<br>napkin | | |
| Trial 5 | 3 | a | dish, cup<br>napkin, spoon | cup<br>napkin | | |

Comments:

## Across Language Cues

Response cues:
1. "Set the _____ and _____ here."
2. "Put the _____ and _____ here."
3. "Place the _____ and _____ here."
4. Teacher points to objects and asks, "What are these?"

| Student 1 | Cues | Materials | Requested Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|
| Trial 1 | 1 | dish, cup<br>napkin, spoon | dish<br>cup | | |
| Trial 2 | 2 | dish, cup<br>napkin, spoon | napkin<br>spoon | | |
| Trial 3 | 3 | dish, cup<br>napkin, spoon | cup<br>spoon | | |
| Trial 4 | 4 | dish, cup<br>napkin, spoon | dish<br>napkin | | |
| Trial 5 | 4 | dish, cup<br>napkin, spoon | cup<br>napkin | | |

Comments:

## C. One-to-One Correspondence

Objective ______1______ Date ____________
Evaluator ____________ Setting ____________

Set equivalence:
- Enough - E
- Not Enough - NE
- Too Many - TM

Array:
1. Vt = Vertical
2. H = Horizontal
3. Va = Varied
4. D = Domino
5. L = Linear

Responses Necessary for Completing the Task:

Cues:
- a. Give each _____ a _____.
- b. Do you have enough?
- c. What is wrong?
- d. How many do you need?
- e. What do you do?

Responses:
- a. Student assigns objects 1-1
- b. Indicates or replies yes-no
- c. Adds more and/or verbalizes amount
- d. Counts out or verbalizes amount
- e. Takes away and/or verbalizes action

## Across Materials

Materials:
1. Quarters
2. Pencils
3. Pictures
4. Tinker Toy

Cues to respond:
a. Give each _____ a _____.

| Student 1 | Cues | Materials | Set Array | Equiv. of Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | a | 1 | Vt | E | | |
| Trial 2 | a | 2 | H | NE | | |
| Trial 3 | a | 3 | H | TM | | |
| Trial 4 | a | 4 | Va | NE | | |
| Trial 5 | a | 2 | L | TM | | |

Comments:

## Across Settings

Setting:
1. Work table
2. Play area
3. Kitchen area

| Student 1 | Setting | Cues | Materials | Set Array | Equiv. of Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | 2 | Vt | E | | |
| Trial 2 | 2 | a | 2 | H | NE | | |
| Trial 3 | 3 | a | 2 | H | TM | | |
| Trial 4 | 2 | a | 2 | Va | NE | | |
| Trial 5 | 1 | a | 2 | L | TM | | |

Comments:

## Across People

People:
1. Aide
2. Student teacher
3. Teacher

| Student 1 | People | Cues | Materials | Set Array | Equiv. of S's Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | 2 | Vt | E | | |
| Trial 2 | 2 | a | 2 | H | NE | | |
| Trial 3 | 3 | a | 2 | H | TM | | |
| Trial 4 | 2 | a | 2 | Va | N | | |
| Trial 5 | 1 | a | 2 | L | TM | | |

Comments:

## Across Language Cues

Response cues:

a. Give each _____ a _____.

b. Put a _____ on each _____

c. Put a _____ in each _____

d. Take a _____ from each _____.

e. Place a _____ in each _____.

| Student 1 | Cue | Material | Set Array | Equiv. of S's Set | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | a | 2 | Vt | E | | |
| Trial 2 | b | 2 | H | NE | | |
| Trial 3 | c | 2 | H | TM | | |
| Trial 4 | d | 2 | Va | N | | |
| Trial 5 | e | 2 | L | TM | | |

Comments:

## D. Equivalence

Objective ______1______ Date ____________________
Evaluator ____________________ Setting ____________________

Responses necessary to complete task:
1. Counts teacher's set correctly (if have rational counting skills)
2. Puts out set equal to teacher's set
3. Matches sets in 1-to-1 correspondence
4. Answers that sets are equal (if student is verbal)
5. Places equal sign between 2 sets

Array:
Va = Varied
H = Horizontal
Vt = Vertical
L = Linear

### Across Materials

Cues to respond:
a. "Make your set equal to mine."
b. "Are the sets equal?"

Materials:
1. Blocks
2. Cups and saucers
3. Flannel trees and apples
4. Stamps on paper (student uses stamp pad)
5. Worksheet - pictures of balloons - student draws balloons

| Student 1 | Cues | Materials | # of Obj. in T's Set | Set Array | Resp. Cor. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | a&b | 1 | 8 | Va | 1___2___3___<br>4 5 | |
| Trial 2 | a&b | 2 | 3 | H | 1___2___3___<br>4 5 | |
| Trial 3 | a&b | 3 | 10 | Vt | 1___2___3___<br>4 5 | |
| Trial 4 | a&b | 4 | 5 | L | 1___2___3___<br>4 5 | |
| Trial 5 | a&b | 5 | 9 | Va | 1___2___3___<br>4 5 | |

Comments:

## Across Settings

Settings:
1. Work table
2. Play area
3. Kitchen area

| Student 1 | Setting | Cues | Materials | # of Obj. in T's Set | Set Array | Resp. Cor. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a&b | 1 | 8 | Va | 1__2__3__<br>4 5 | |
| Trial 2 | 2 | a&b | 1 | 3 | H | 1__2__3__<br>4 5 | |
| Trial 3 | 3 | a&b | 1 | 10 | Vt | 1__2__3__<br>4 5 | |
| Trial 4 | 2 | a&b | 1 | 5 | L | 1__2__3__<br>4 5 | |
| Trial 5 | 1 | a&b | 1 | 9 | Va | 1__2__3__<br>4 5 | |

Comments:

## Across People

People:
1. Aide
2. Student teacher
3. Teacher

| Student 1 | People | Cues | Materials | # of Obj. in T's Set | Set Array | Resp. Cor. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a&b | 1 | 8 | Va | 1__2__3__<br>4 5 | |
| Trial 2 | 2 | a&b | 1 | 3 | H | 1__2__3__<br>4 5 | |
| Trial 3 | 3 | a&b | 1 | 10 | Vt | 1__2__3__<br>4 5 | |
| Trial 4 | 1 | a&b | 1 | 5 | L | 1__2__3__<br>4 5 | |
| Trial 5 | 3 | a&b | 1 | 9 | Va | 1__2__3__<br>4 5 | |

Comments:

## Across Language Cues

Cues to respond:
- a. "Make your set equal to mine."
- b. "Are the sets equal?"
- c. "Are there enough?"
- d. "Is your set equal to mine?"

| Student 1 | Cues | Materials | # of Obj. in T's Set | Set Array | Resp. Cor. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | a&b | 1 | 8 | Va | 1__2__3__<br>4 5 | |
| Trial 2 | a&c | 1 | 3 | H | 1__2__3__<br>4 5 | |
| Trial 3 | a&d | 1 | 10 | Vt | 1__2__3__<br>4 5 | |
| Trial 4 | a&d | 1 | 5 | L | 1__2__3__<br>4 5 | |
| Trial 5 | a&b | 1 | 9 | Va | 1__2__3__<br>4 5 | |

Comments:

## E. More-Less

Objective 3 (more/less) Date ____________________
Evaluator ____________________ Setting ____________________

Set Array:
- Vt = Vertical
- H = Horizontal
- L = Linear
- Va = Varied
- O = One to One

Number of Objects in Sets:
1. 3-10
2. 2-7
3. 3-5
4. 5-6
5. 2-3

## Across Materials

Response cues:
a. Take/Touch (more/less)

Materials:
1. Pencils
2. Quarters
3. Shoes
4. Tinker Toys

| Student 1 | Cues | Materials | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | a | 1 | 3-10 | Va | | |
| Trial 2 | a | 2 | 2-7 | Vt | | |
| Trial 3 | a | 3 | 3-5 | H | | |
| Trial 4 | a | 4 | 5-6 | L | | |
| Trial 5 | a | 1 | 2-3 | Vt | | |

Comments:

## Across Settings

Settings:
1. Work table
2. Play area
3. Kitchen area

| Student 1 | Setting | Cues | Materials | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | 4 | 3-10 | Va | | |
| Trial 2 | 2 | a | 4 | 2-7 | Vt | | |
| Trial 3 | 3 | a | 4 | 3-5 | H | | |
| Trial 4 | 2 | a | 4 | 5-6 | Va | | |
| Trial 5 | 1 | a | 4 | 2-3 | Vt | | |

Comments:

## Across People

People:
1. Aide
2. Student teacher
3. Teacher

| Student 1 | People | Cues | Mat-erials | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | 4 | 3-10 | Va | | |
| Trial 2 | 2 | a | 4 | 2-7 | H | | |
| Trial 3 | 3 | a | 4 | 3-5 | Vt | | |
| Trial 4 | 2 | a | 4 | 5-6 | Vt | | |
| Trial 5 | 1 | a | 4 | 2-3 | Va | | |

Comments:

## Across Language Cues

Response cues:
a. "Take/touch (more/less)."
b. "Count the _____.
Which is (more/less)?"
c. "Count the _____.
Which is (more/less) #__ or #__?"

| Student 1 | Cues | Materials | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|
| Trial 1 | a | 4 | 3-10 | Va | | |
| Trial 2 | b | 4 | 2-7 | H | | |
| Trial 3 | c | 4 | 3-5 | Vt | | |
| Trial 4 | b | 4 | 5-6 | Va | | |
| Trial 5 | c | 4 | 2-3 | Vt | | |

Comments:

## F. Conservation of Number

Objective 2

Evaluator

Date

Setting

Set Equivalence:
Equivalent Sets = E
Nonequivalent Sets = NE

Set Array:
Va = Varying arrangement of a set
M.T. = Move together
S.O. = Spread one set of obj. apart
M.C. = Move one set of obj. closer together
S.G. = Subgroup member of 1 set

### Across Materials

Cues to respond:
a. "Are the sets equal?"

Materials:
1. Pencils
2. Quarters
3. Shoes
4. Tinker Toys
5. Books

| Student 1 | Cue | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | a | 1 | E | 7 | S.O. | | |
| Trial 2 | a | 2 | NE | 9 | M.G. | | |
| Trial 3 | a | 3 | NE | 5 | S.G. | | |
| Trial 4 | a | 4 | E | 3 | Va | | |
| Trial 5 | a | 5 | E | 7 | S.O. | | |

Comments:

## Across Settings

Settings:
1. Play area
2. Kitchen area
3. Lounge

| Student 1 | Setting | Cues | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | cups | E | 9 | S.G. | | |
| Trial 2 | 3 | a | cups | E | 5 | S.O. | | |
| Trial 3 | 2 | a | cups | NE | 7 | V | | |
| Trial 4 | 1 | a | cups | NE | 3 | M.C. | | |
| Trial 5 | 1 | a | cups | E | 5 | S.O. | | |

Comments:

## Across People

People:
1. Aide
2. Student teacher

| Student 1 | Evaluator | Cues | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | cups | E | 9 | S.O. | | |
| Trial 2 | 2 | a | cups | NE | 5 | S.O. | | |
| Trial 3 | 2 | a | cups | E | 7 | M.C. | | |
| Trial 4 | 1 | a | cups | E | 3 | V | | |
| Trial 5 | 1 | a | cups | NE | 5 | S.G. | | |

Comments:

## Across Language Cues

Response cues:
1. Do the sets have the same number
2. Do the sets have a different number
3. Does one set have more

| Student 1 | Cues | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | cups | NE | 7 | S.G. | | |
| Trial 2 | 1 | cups | NE | 9 | V | | |
| Trial 3 | 2 | cups | E | 9 | S.O. | | |
| Trial 4 | 3 | cups | E | 7 | S.O. | | |
| Trial 5 | 2 | cups | NE | 3 | M.C. | | |

Comments:

## G. Conservation of Number

Objective 4

Date

Evaluator

Setting

Set Equivalence:
Equivalent Sets = E
Nonequivalent Sets = NE

Objects Added:
Always 1

## Across Materials

Cues to respond:
a. "Are the sets equal?"

Materials:
1. Crayons
2. Apples
3. Toothbrushes
4. Cars
5. Junk items

| Student 1 | Cues | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | a | 1 | E | 7 | S.O. | | |
| Trial 2 | a | 2 | NE | 9 | S.O. | | |
| Trial 3 | a | 3 | NE | 5 | S.G. | | |
| Trial 4 | a | 4 | E | 3 | V | | |
| Trial 5 | a | 5 | E | 7 | S.G. | | |

Comments:

## Across Settings

Settings:
1. Play area
2. Kitchen area
3. Lounge

| Student 1 | Setting | Cues | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | cups | E | 9 | S.G. | | |
| Trial 2 | 3 | a | cups | E | 5 | V | | |
| Trial 3 | 2 | a | cups | NE | 7 | S.O. | | |
| Trial 4 | 1 | a | cups | NE | 3 | S.O. | | |
| Trial 5 | 1 | a | cups | E | 5 | V | | |

Comments:

## Across People

People:
1. Aide
2. Student teacher

| Student 1 | People | Cues | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | cups | E | 9 | S.O. | | |
| Trial 2 | 2 | a | cups | NE | 5 | S.O. | | |
| Trial 3 | 2 | a | cups | E | 7 | V | | |
| Trial 4 | 1 | a | cups | E | 3 | S.G. | | |
| Trial 5 | 1 | a | cups | NE | 5 | V | | |

Comments:

## Across Language Cues

Response cues:
1. Do the sets have the same number?
2. Do the sets have a different number?
3. Does one set have more?

| Student 1 | Cues | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | cups | NE | 7 | S.G. | | |
| Trial 2 | 1 | cups | NE | 9 | V | | |
| Trial 3 | 2 | cups | E | 9 | S.O. | | |
| Trial 4 | 3 | cups | E | 7 | S.O. | | |
| Trial 5 | 2 | cups | NE | 3 | S.G. | | |

Comments:

## H. Conservation of Number

Objective 6
Evaluator
Date
Setting

Set Equivalence:
Equivalent Sets = E
Nonequivalent Sets = NE

Objects Taken Away:
Always 1

## Across Materials

Cues to respond:
a. "Are the sets equal?"

Materials:
1. Crayon
2. Quarter
3. Oranges
4. Books
5. Toothbrushes

| Student 1 | Cues | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | a | 1 | E | 7 | S.O. | | |
| Trial 2 | a | 2 | NE | 9 | V | | |
| Trial 3 | a | 3 | NE | 5 | V | | |
| Trial 4 | a | 4 | E | 3 | S.O. | | |
| Trial 5 | a | 5 | E | 7 | S.G. | | |

Comments:

## Across Settings

Settings:
1. Play area
2. Kitchen area
3. Lounge

| Student 1 | Setting | Cues | Materials | Set Equiv. | Set Array | # of Obj. in Sets | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | cups | E | S.O. | | | |
| Trial 2 | 3 | a | cups | E | S.G. | | | |
| Trial 3 | 2 | a | cups | E | V | | | |
| Trial 4 | 1 | a | cups | NE | V | | | |
| Trial 5 | 1 | a | cups | NE | S.G. | | | |

Comments:

## Across People

People:
1. Aide
2. Student teacher

| Student 1 | People | Cues | Materials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | cups | E | 9 | S.O. | | |
| Trial 2 | 2 | a | cups | NE | 5 | S.O. | | |
| Trial 3 | 2 | a | cups | E | 7 | V | | |
| Trial 4 | 1 | a | cups | E | 3 | S.G. | | |
| Trial 5 | 1 | a | cups | NE | 5 | V | | |

Comments:

## Language Cues

Response cues:
1. "Do the sets have the same number?"
2. "Do the sets have a different number?"
3. "Does one set have more?"

| Student 1 | Cues | Mat-erials | Set Equiv. | # of Obj. in Sets | Set Array | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | cups | NE | 7 | S.G. | | |
| Trial 2 | 1 | cups | NE | 9 | V | | |
| Trial 3 | 2 | cups | E | 9 | S.O. | | |
| Trial 4 | 3 | cups | E | 7 | S.O. | | |
| Trial 5 | 2 | cups | NE | 3 | V | | |

Comments:

## I. Rational Counting

Objective ____________________ Date ____________________

Evaluator ____________________ Setting __________________

Arrays:
Horizontal = H
Vertical = Vt
Random = R
Crooked = C

Marking:
Student touches as counting = Marks
Does not touch = No Marks

### Across Materials

Cues to respond:
a. "Count the _____."

Materials:
1. Cups
2. Pennies
3. Pieces of gum
4. Crayons
5. Junk items

| Student 1 | Cues | Mat-erials | Ar-ray | # of Obj. in Sets | Rows in Set | Mark-ing | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|
| Trial 1 | a | 1 | Vt | 2 | 1 | Marks | | |
| Trial 2 | a | 2 | Vt | 4 | 1 | Marks | | |
| Trial 3 | a | 3 | H | 5 | 1 | Marks | | |
| Trial 4 | a | 4 | H | 3 | 1 | Marks | | |
| Trial 5 | a | 5 | Vt | 1 | 1 | Marks | | |

Comments:

## Across Settings

Setting:
1. Play area
2. Kitchen area
3. Milk break area

| Student 1 | Setting | Cues | Materials | Array | # of Obj. in Set | Rows in Set | Marking | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | cups | Vt | 2 | 1 | Marks | | |
| Trial 2 | 3 | a | cups | Vt | 4 | 1 | Marks | | |
| Trial 3 | 2 | a | cups | H | 5 | 1 | Marks | | |
| Trial 4 | 1 | a | cups | H | 3 | 1 | Marks | | |
| Trial 5 | 2 | a | cups | Vt | 4 | 1 | Marks | | |

Comments:

## Across People

People:
1. Aide
2. Student teacher A
3. Student teacher B

| Student 1 | People | Cues | Materials | Array | # of Obj. in Set | Rows in Set | Marking | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|---|
| Trial 1 | 1 | a | cups | Vt | 2 | 1 | Marks | | |
| Trial 2 | 2 | a | cups | Vt | 4 | 1 | Marks | | |
| Trial 3 | 3 | a | cups | H | 5 | 1 | Marks | | |
| Trial 4 | 2 | a | cups | H | 3 | 1 | Marks | | |
| Trial 5 | 3 | a | cups | H | 5 | 1 | Marks | | |

Comments:

## Across Language Cues

Response cues:
- a. "Count the _____."
- b. "How many _____."
- c. "Give me #___."
- d. "Show me #___."

| Student 1 | Cues | Materials | Set Array | # of Obj. in Set | Rows in Set | Marking | Cor. of Resp. | Type of Error |
|---|---|---|---|---|---|---|---|---|
| Trial 1 | a | cups | Vt | 2 | 1 | Marks | | |
| Trial 2 | d | cups | Vt | 4 | 1 | Marks | | |
| Trial 3 | c | cups | H | 5 | 1 | Marks | | |
| Trial 4 | d | cups | H | 3 | 1 | Marks | | |
| Trial 5 | b | cups | H | 5 | 1 | Marks | | |

Comments:

# TEACHING TRAINABLE LEVEL MULTIPLY HANDICAPPED STUDENTS TO USE PICTURE CUES, CONTEXT CUES AND INITIAL CONSONANT SOUNDS TO DETERMINE THE LABELS OF UNKNOWN WORDS

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Instructional curricula in schools for students referred to as "trainable mentally retarded" is usually restricted to: 1) self-help skills; 2) social adjustment in the family and the neighborhood; and 3) economic usefulness in the house, residential school or sheltered workshop (Kirk, 1972). The rationale for these restrictions is based on the underlying assumption that the trainable level students' mental limitations dictate circumscribed instructional goals. The absence of reading as a viable instructional area for the trainable retarded student logically follows as an extension of this reasoning. Much of the literature dealing with the education of trainable students places little emphasis on the teaching of reading and often discourages attempts to develop such programs (Burton, 1974; Kirk, 1972; Lent, 1975). For example, the following is a quote from Kirk (1972) dealing with the education of exceptional children.

> "In general, trainable children do not learn to read from even first grade books. Their ability is limited to reading and recognizing their names, isolated words and phrases, common words used for their protection, such as 'danger', 'stop', 'men', 'women', and other signs which they encounter in a community. Some trainable children with special abilities can learn to read. Most who learn to read, however, are probably educable mentally retarded children (Kirk, 1972, p. 231)."

Fortunately, the above rationale has been challenged by those who believe that trainable level students' apparent deficits in academic functioning may be a result of inadequate instructional programming rather than inherent mental limitations. These people have demonstrated in a number of recent studies that individualized reading instruction, utilizing basic principles of performance, task analysis, and continuous evaluation can result in the acquisition of reading skills by trainable level retarded students. For example, some retarded students were taught to functionally read nouns and adjective-noun phrases (Brown, Jones, Troccolo, Heiser, Bellamy and

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Sontag, 1972); to acquire basic language and reading skills culminating in the reading of chart stories (Johnson and Brown, 1974); and to answer comprehension questions by printing answers to who, what and where questions (Domnie and Brown, 1974). Obviously, the acquisition of such reading skills will better prepare the retarded individual to function independently in a complex society in that reading skills are necessary to follow written directions, use telephone directories, avoid poisonous or dangerous events and gain information from newspapers and other printed materials.

Each of the studies cited above used the "whole word" or "sight word" approach to teach basic reading skills. This approach requires the student to recognize entire printed words by sight, probably utilizing clues such as word configuration, word length, capital letters, initial letters, double letters and other details. Unfortunately, there are limitations to the "whole word" approach as delineated in programs for trainable level students: 1) The "whole word" approach is typically teacher dependent. That is, the learning of new words requires a teacher for word introduction and drill; 2) The "whole word" approach does not teach reading skills which provide for self-instruction when analyzing new words, such as following word analysis skills: phonic, phonetic, contextual and structural analysis as well as picture reading; 3) It is doubtful that the whole word approach, in itself, will provide the trainable level individual with the multitude of words required for independent functional reading.

As an alternative to the "whole word" approach, an approach based strictly on letter-sound relationships might be considered. In this approach, reading is taught by translating phonemes (sounds) into words. The teacher using the process of translating sounds into words need not be concerned with the use of meaningful words and commonly selects "regularly" spelled words (e.g., cat, fat, hat, tat, etc.), arranged in repetitive sentences. The student early in his instruction learns to pronounce words by sounding letters and blending these sounds into words. A major advantage to an approach based on letter-sound relationships is that it provides the skills necessary for self-instruction. The teacher is no longer depended upon for word introduction and drill since the student can analyze and label words through knowledge of letter sounds. This approach was rejected as a viable reading approach with the students involved in this program for the following reasons: 1) The students were multiply handicapped manifesting a plethora of physical, sensory and intellectual disabilities. Many of their physical difficulties have produced articulation deficits which would have interfered with the implementation of an approach based solely on letter-sound relationships; 2) Controlled vocabulary resulting from "regularly" spelled words commonly produces artificial story lines which are not based on true life experiences. Such reading content was judged nonmeaningful and nonfunctional for the students of concern; and 3) Little merit is placed on the development of supplementary word analysis skills such as the use of printed context and picture context cues to analyze words.

The position offered here is that the acquisition of some combination of sight words and word analysis skills may be most appropriate for trainable level multiply handicapped students. These skills need not be viewed as incompatible or mutually exclusive but rather as complimentary components of a functional reading repertoire. If the trainable level students can be taught to utilize effectively word analysis skills when reading, it may ultimately be possible for such students to decode unfamiliar words without direct teacher instruction and thus increase their chances for independent functioning in a complex symbol based community setting. This program represents a preliminary attempt to delineate and empirically verify an instructional arrangement that can be used to develop a combination of word analysis skills in trainable level multiply handicapped students. More specifically, the students were taught to use picture cues, context cues and initial consonant sounds to determine the labels of unknown words.

The following prerequisite skills were considered necessary for entry into the program:

1. Imitation of teacher provided consonant sounds;
2. Rudimentary speech;
3. A sight vocabulary of at least 50 words;
4. Left to right eye movement when reading;
5. A reliable and valid yes-no response;
6. A basic understanding of logical and absurd relationships.

The ability to imitate consonant sounds was essential since modeling was a primary correction procedure used by the teacher during instruction. Rudimentary speech was necessary considering the large amount of required verbal responses. A sight vocabulary of at least 50 words and left to right eye movement when reading were considered essential since the program required reading words in sentences. A reliable yes-no response was necessary for evaluating performance in several components of the program. A basic understanding of real and absurd relationships was considered important in order to perform contextual analysis skills at the established difficulty level. In an attempt to communicate the precise content of the program a detailed task analysis is presented below:

Phase I: When students are presented with a printed word they cannot label and four pictures that represent objects and actions with differing initial consonant sounds, they will determine the label of the unknown word by finding and labeling the picture which represents the object or action with the same initial consonant sound.

Part 1 - Teaching students to label object pictures and describe action pictures.

Part 2 - Teaching students to sound consonants presented on flashcards.

Part 3a - Teaching students to touch the first letter (color coded) in printed words.

Part 3b - Teaching students to touch the first letter (not color coded) in printed words.

Part 4 - Teaching students to sound initial consonants in selected printed words.

Part 5 - Teaching students to label object pictures, to describe action pictures, and to make the initial consonant sounds of the objects and actions represented in the pictures (e.g., Q - "What is this?" A - "(ball)" Q - "What is the first sound in (ball)" or Q - "What is the (boy) doing?" A - "(running)" Q - "What is the first sound in (running)?").

Part 6 - Teaching students to label object pictures, to describe action pictures, and to make the initial consonant sounds of the objects and actions represented in those pictures (e.g., Q - "What is this?" A - "(ball)" Q - "What is the first sound in that word?" or Q - "What is the (boy) doing?" A - "(running)" Q - "What is the first sound in that word?").

Part 7 - Teaching students to make the initial consonant sounds of objects and actions represented in pictures (e.g., "What is the first sound in this?").[2]

Part 8 - Teaching students to touch the appropriate object or action picture in response to a consonant sound stated by the teacher (e.g., "Touch the thing that begins with (bb).").[3]

Part 9 - When students are presented with a printed word they cannot label and four pictures that represent objects and actions with differing initial consonant sounds, they will determine the label of the unknown word by finding and labeling the picture which represents the object or action with the same initial consonant sound.

Phase II: When students are presented with a worksheet containing sentences composed of words they can label but which are missing one word in the subject, verb or object position (e.g., The ______ hit the ball. The boy ______ the ball. The boy hit the ______.) and three printed words above each sentence, they will mark the one word that logically completes the sentence.

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[2] Parts 5 and 6 differ in that the teacher repeats object labels and action descriptions in Part 5 but does not do so in Part 6. In Part 7, neither the teacher nor the student labels object pictures or describes action pictures.

[3] (bb) as in boy.

Part 1 - Teaching students to label object pictures and describe action pictures.

Part 2 - When students are presented with eight sets of two pictures, one component of each set depicting an absurd action (e.g., teacher combing hair with toothbrush) and the other component depicting a logical action (e.g., teacher combing hair with comb) and the question, "Does this picture make sense?", they will respond "yes" to pictures of logical actions and "no" to pictures of absurd actions.

Part 3 - When students are read sentences which are logical or absurd following the question, "Does this sentence make sense?" they will respond "yes" to logical sentences and "no" to absurd sentences.

Part 4a - When students are presented with a printed sentence read by the teacher with one word missing in the object position (e.g., The boy hit the _____.) and three object pictures, they will touch the one picture that represents the object which logically completes the sentence.

Part 4b - When students are presented with a printed sentence read by the teacher with one word missing in the verb position (e.g., The boy _____ the ball.) and three action pictures, they will touch the one picture that represents the verb which logically completes the sentence.

Part 4c - When students are presented with a printed sentence read by the teacher with one word missing in the subject position (e.g., The _____ hit the ball.) and three object pictures, they will touch the one picture that represents the subject which logically completes the sentence.

Part 4d - When students are presented with a printed sentence read by the teacher with one word missing in either the subject, verb or object position (e.g., The _____ hit the ball. The boy _____ the ball. The boy hit the _____.) and three object or action pictures, they will touch the one picture that represents the subject, verb or object which logically completes the sentence.

Part 5 - When students are presented with a printed sentence read by the teacher with one word missing in the subject, verb or object position (e.g., The _____ hit the ball. The boy _____ the ball. The boy hit the _____.) and three printed words, they will touch the one word that logically completes the sentence.

Part 6 - When students are presented with a worksheet containing sentences composed of words they can label but which are missing one word in the subject, verb or object position (e.g., The _____ hit the ball. The boy _____ the ball. The boy hit the _____.) and three printed words above each sentence, they will mark the one word that logically completes each sentence.

Phase III: When students are presented with a worksheet containing sentences composed of words they can label with the exception of one underlined word in the subject, verb or object position and four pictures above each sentence, they will determine the label of the underlined word by marking and naming the one picture which represents the object or action with a) the same initial consonant sound as the underlined word and b) which logically completes the sentence.

Part 1 - Teaching students to label object pictures and describe action pictures as they are presented on worksheets.

Part 2 - When students are presented with a worksheet containing sentences composed of words they can label with the exception of one underlined word in the subject, verb or object position and four pictures above each sentence, they will determine the label of the underlined word by marking and labeling the one picture which represents the object or action a) with the same initial consonant sound as the underlined word and b) which logically completes the sentence.

## Method

### Students (Ss)

Ss ($S_1$, $S_2$ and $S_3$) were members of a self-contained classroom for multiply handicapped children in the Madison Public School system. Ss were labeled both "trainable mentally retarded" and "orthopedically handicapped." At the conclusion of this program they ranged in chronological age from 8 years and 10 months to 11 years and 10 months ($\bar{X}$ = 9 years and 9 months). Their most recently obtained IQ scores ranged from 47 to 51 ($\bar{X}$ = 49).

$S_1$ was an 11 year and 10 month old girl who obtained an IQ score of 47 on the Stanford Binet Test of Intelligence. $S_1$'s orthopedic diagnosis was as follows: severe spastic quadriplegia and microcephaly. Due to her spasticity, $S_1$ had severely impaired articulation, limited spontaneous speech, and was confined to a wheelchair. $S_1$ lived with her natural parents and 5 siblings.

$S_2$ was a 10 year and 2 month old girl who obtained an IQ score of 49 on the Stanford Binet Test of Intelligence. $S_2$'s orthopedic diagnosis was as follows: encephalopathy due to metabolic growth or nutritional disorder; congenital amyotonia which is a neuromuscular condition resulting in progressive deterioration of muscle strength and the spreading loss of sensation. $S_2$ was also confined to a wheelchair and was noticeably regressing physically (e.g., loss of gag reflex, difficulty swallowing, difficulty breathing when asleep). $S_2$ was living in a foster home with two foster siblings.

$\underline{S}_3$ was an 8 year and 10 month old boy who obtained an IQ score of 51 on the Stanford Binet Test of Intelligence. $\underline{S}_3$'s orthopedic diagnosis was as follows: spastic double hemiplegia (left side more affected). $\underline{S}_3$ was ambulant with the help of long leg braces and a walker. His articulation was moderately impaired due to his spasticity. $\underline{S}_3$ was living in a foster home with one foster sibling.

## Instructional Materials

### Phase I

Part 1[4] - Instructional Materials

A) Object pictures (3" x 3") which were commercially produced[5] or teacher-made were as follows:

monkey
bell
watermelon
fork
pan
needle
ruler
rain
pencil
nail
girl
witch
finger
boat
purse
mitten
bear
water
fish
rug
nest
goat
nuts
ring
pumpkin
nurse
game
garden
numbers
man
bat
window
fire
mop
gate

B) Action pictures (3" x 3") which were commercially produced or teacher-made were as follows:

fun
grow
mix
bounce
mow
pour
fight
brush
read
wash
pop
fall
walk

C) Data sheet as shown in Appendix A

Part 2 - Instructional Materials

A) Eight consonants were printed on manilla cards (2" x 2") and divided into two sets of four as follows:

Set 1: m, b, w, f
Set 2: r, p, n, g

B) Data sheet as shown in Appendix A

Part 3a - Instructional Materials

A) Eight words were printed on manilla cards (2 1/2" x 6") in blue with the first letter red and were divided into two sets as follows:

---

[4] Exact reading of Parts 1 through 9 can be found in the Task Analysis section of this paper.

[5] All commercially produced pictures used in this program were ideal consonant pictures for Peg Board No. 2721.

Set 1: monkey, bell, watermelon, fork
Set 2: rain, pencil, nail, girl

B) Data sheet as shown in Appendix A

Part 3b - Instructional Materials

A) Eight words were printed on manilla cards (2 1/2" x 6") and divided into two sets as follows:

Set 1: mitten, hear, water, fish
Set 2: rug, pumpkin, nurse, game

B) Data sheet as shown in Appendix A

Part 4 - Instructional Materials

A) Sixteen words were printed on manilla cards (2 1/2" x 6") with the following initial consonant sounds: m, b, w, f, r, p, n, g, and were divided into two sets as follows:

Set 1: monkey, bell, watermelon, fork, rain, pencil, nail, girl
Set 2: man, bat, window, fire, run, pan, needle, grow

B) Data sheet as shown in Appendix A

Part 5 - Instructional Materials

A) Sixteen pictures (3" x 3") which represented objects or actions with the initial consonant sounds: m, b, w, f, n, p, r, g were divided into two sets as follows:

Set 1: man, bat, window, fire, run, pan, needle, game
Set 2: mow, bounce, witch, finger, ring, pour, next, goat

B) Data sheet as shown in Appendix A

Part 6 - Instructional Materials

A) Sixteen pictures (3" x 3") which represented objects and actions with the initial consonant sounds: m, b, w, f, r, p, n, g were divided into two sets as follows:

Set 1: monkey, rain, brush, girl, water, fork, pop, nurse
Set 2: mitten, read, bell, garden, wash, fall, pencil, nail

B) Data sheet as shown in Appendix A

Part 7 - Instructional Materials

A) Sixteen pictures (3" x 3") which represented objects and actions with the initial consonant sounds: m, b, w, f, r, p, n, g were divided into two sets as follows:

Set 1: mop, bear, watermelon, fish, rug, pumpkin, numbers, gate
Set 2: walk, mix, boat, fight, ruler, purse, nuts, grow

B) Data sheet as shown in Appendix A

Part 8 - Instructional Materials

A) Sixteen pictures (3" x 3") which represented objects and actions with the initial consonant sounds: m, b, w, f, r, p, n, g were divided into two sets as follows:

Set 1: monkey, ran, brush, girl, water, fork, pop, nurse
Set 2: mitten, read, bill, garden, wash, fall, pencil, nail

B) Data sheet as shown in Appendix A

Part 9 - Instructional Materials

A) Sixteen words were printed on manilla cards (2 1/2" x 6") with the following initial consonant sounds: m, b, w, f, r, p, n, g and were divided into two sets as follows:

Set 1: mop, bear, watermelon, fish, rug, pumpkin, numbers, gate
Set 2: walk, monkey, boat, fight, ruler, purse, nuts, grow

B) Sixteen object and action pictures (3" x 3") depicting each of the words listed in Part 9-A, Sets 1 and 2.

C) Data sheet as shown in Appendix A.

Phase II

Part 1 - Instructional Materials

A) Object pictures (3" x 3") which were commercially produced or teacher-made were as follows:

table
tiger
doctor
farmer
carrot
watch
door
football
sun
scissors
mouse
cap
ladder
horse
dog
car
gum
bee
sock
milk
ball
bed
pig
phone
kite
sandwich
book
bus
banana
key
balloon
lamp

B) Action pictures (3" x 3") which were commercially produced or teacher-made were as follows:

throw
ride
rake
wave
hit
read
drive
spill
sit
run
pick
jump
open
shovel
sip

C) Data sheet as shown in Appendix A

Part 2 - Instructional Materials

A) Sixteen photographs of the teacher performing actions that are logical or actions that are absurd were divided into two sets of eight as follows:

Set 1:
1. Teacher cutting paper with scissors
2. Teacher cutting table with scissors
3. Teacher putting a sock on her foot
4. Teacher putting a sock on her hand
5. Teacher combing her hair with a comb
6. Teacher combing her hair with a toothbrush
7. Teacher holding pencil with hand and writing
8. Teacher holding pencil between toes and writing

Set 2:
1. Teacher sitting on chair at table holding up sight words
2. Teacher sitting on upside down chair at upside down table, holding up sight words
3. Teacher sipping a bottle of coke through a straw
4. Teacher holding a bottle of coke in her ear with the straw in her mouth
5. Teacher standing at the front of the room pointing to the days
6. Teacher standing on her head at the front of the room, pointing to the days of the week with the pointer between her toes
7. Teacher playing with toys
8. Teacher cutting toys on a plate with a fork and knife

B) Data sheet as shown in Appendix A

Part 3 - Instructional Materials

A) Twelve sentences read by the teacher which described logical or absurd actions were divided into two sets of six as follows:

Set 1:
1. We eat clothes for dinner.
2. We eat food for dinner.
3. Daddy drives a car.
4. Daddy throws a car.
5. The dog chased the cat.
6. The banana chased the cat.

Set 2:
1. Let's play juice.
2. Let's play ball.
3. I will mow the lawn.
4. I will bounce the lawn.
5. The car tastes the food.
6. The boy tastes the food.

B) Data sheets as shown in Appendix A.

Part 4a - Instructional Materials

A) Twelve sentences, each one missing a word in the object position, were printed on manilla cards (3" x 14") and divided into the following two sets of six. Along with these two sets of six sentences were the following two sets of object pictures (3" x 3").

| | | sentences | pictures |
|---|---|---|---|
| Set 1: | 1. | I like to chew _____. | gum, dog, car |
| | 2. | Mother drives the _____. | |
| | 3. | I like to pet my _____. | |
| | 4. | We drink _____. | ball, bed, milk |
| | 5. | You throw the _____. | |
| | 6. | I sleep in the _____. | |
| Set 2: | 1. | The children are reading the _____. | bus, book, sandwich |
| | 2. | The children ride the _____. | |
| | 3. | The boy eats the _____. | |
| | 4. | The girl is riding the _____. | door, horse, lamp |
| | 5. | Daddy turned on the _____. | |
| | 6. | I opened the _____. | |

B) Data sheet as shown in Appendix A

Part 4b - Instructional Materials

A) Twelve sentences, each one missing a word in the verb position, were printed on manilla cards (3" x 14") and divided into the following two sets of six. Along with these two sets of six sentences were the following two sets of action pictures (3" x 3").

| | sentences | pictures |
|---|---|---|
| Set 1: | 1. The boy is _____ the milk. | spilling, hitting, reading |
| | 2. The boy is _____ the ball. | |
| | 3. The boy is _____ the book. | |
| | 4. The boy is _____ the milk. | opening, shoveling, drinking |
| | 5. The boy is _____ the book. | |
| | 6. The boy is _____ the door. | |
| Set 2: | 1. The girl is _____ rope. | sitting, picking, jumping |
| | 2. The girl is _____ flowers. | |
| | 3. The girl is _____ on the chair. | |
| | 4. The boy is _____ the ball. | throwing, raking, riding |
| | 5. The boy is _____ the horse. | |
| | 6. The boy is _____ the leaves. | |

B) Data sheets as shown in Appendix A.

Part 4c - Instructional Materials

A) Twelve sentences, each one missing a word in the subject position, were printed on manilla cards (3" x 14") and divided into the following two sets of six. Along with these two sets of six sentences were the following two sets of object pictures (3" x 3").

| | sentences | pictures |
|---|---|---|
| Set 1: | 1. The _____ tastes good. | farmer, carrot, doctor |
| | 2. The _____ gives me medicine. | |

| | sentences | pictures |
|---|---|---|
| | 3. The _____ milks the cow. | |
| | 4. The _____ runs fast. | sun, scissors, mouse |
| | 5. The _____ cut the paper. | |
| | 6. The _____ is shining bright. | |
| Set 2: | 1. The _____ will pop. | balloons, key, banana |
| | 2. The _____ opens the door. | |
| | 3. The _____ is shining in the sky. | |
| | 4. The _____ flys high in the sky. | pig, telephone, kite |
| | 5. The _____ rings loud. | |
| | 6. The _____ eats lots of food. | |

B) Data sheet as shown in Appendix A.

Part 4d - Instructional Materials

A) Twelve sentences, each one missing a word in the subject, verb or object position, were printed on manilla cards (3" x 14") and divided into two sets of six. Along with these two sets of six sentences were the following two sets of six objects or action pictures (3" x 3").

| | sentences | pictures |
|---|---|---|
| Set 1: | 1. Daddy will _____ the car. | drive, ladder, throw |
| | 2. Daddy will climb the _____. | drive, cap, ladder |
| | 3. My _____ is on my head. | drive, cap, ladder |
| | 4. The men _____ goodbye. | wave, throw, football |
| | 5. I will throw the _____. | wave, watch, football |
| | 6. My _____ tells the time. | wave, watch, football |
| Set 2: | 1. The children _____ the snowball. | throw, table, run |
| | 2. The _____ growled at me. | throw, table, tiger |
| | 3. We eat at the _____. | table, tiger, throw |

| sentences | pictures |
|---|---|
| 4. The boy will _____ to school. | run, sock, throw |
| 5. The _____ fits on my foot. | run, sock, bee |
| 6. I got stung by the _____. | run, sock, bee |

B) Data sheet as shown in Appendix A.

Part 5 - Instructional Materials

A) Twelve sentences, each one missing a word in the subject, verb or object printed on manilla cards (3" x 14") and divided into two sets of six. Above each of the twelve sentences were three printed words.

| | sentences | printed words |
|---|---|---|
| Set 1: | 1. Daddy will _____ the meat. | cut, play, cereal |
| | 2. Watch the children throw the _____. | ball, school, put |
| | 3. The _____ is jumping rope. | girl, candy, book |
| | 4. I will _____ the game. | win, mix, tractor |
| | 5. We live in a _____. | house, pig, make |
| | 6. The _____ has many animals. | farm, hall, make |
| Set 2: | 1. Mother said, _____ your toys away. | put, look, school |
| | 2. The _____ is watching T.V. | boy, game, ride |
| | 3. The children play a _____. | game, cut, candy |
| | 4. Mike will _____ the marshmallows and cereal. | mix, cone, animals |
| | 5. Santa Claus will come on _____. | Christmas, see, girl |
| | 6. The _____ is round and it bounces. | ball, house, see |

B) Data sheet as shown in Appendix A.

Part 6 - Instructional Materials

A) Four worksheets, each containing six printed sentences missing a word in the subject, verb, or object position with three printed words above each sentence, were as follows:

| | sentences | words |
|---|---|---|
| Set 1: | 1. We play the _____. | game, come, house |
| | 2. Can you _____ the ball? | mix, treat, find |
| | 3. The _____ is good to eat. | house, marshmallow, play |
| | 4. Let's _____ to school. | go, like, farm |
| | 5. We will ride on the _____. | have, ball, tractor |
| | 6. The _____ works on the farm. | eat, man, school |
| Set 2: | 1. I like to eat _____. | yellow, play, candy |
| | 2. I will _____ Santa Claus on Christmas. | see, work, pig |
| | 3. The _____ is fun to play with. | ball, candy, cut |
| | 4. We work in _____. | ride, animals, school |
| | 5. I can _____ on the tractor. | put, ride, girl |
| | 6. The _____ will eat the marshmallow. | girl, ball, play |
| Set 3: | 1. We play on the _____. | drink, swing, marshmallow |
| | 2. Janet will _____ the ice cream cone. | eat, work, train |
| | 3. _____ is a girl. | come, train, Janet |
| | 4. We will ride on the _____. | ball, train, look |
| | 5. Janet and Mark _____ something good. | want, look, swing |
| | 6. The _____ will go on the swing. | farm, come, girl |
| Set 4: | 1. Daddy will ride in the _____. | balloon, car, put |
| | 2. You can _____ one balloon. | have, eat, train |
| | 3. _____ will have a train ride. | farm, like, Mark |
| | 4. Let's go in the _____. | house, animals, find |
| | 5. Janet and Mark want to _____ with socks. | one, play, see |
| | 6. The _____ is good to eat. | man, like, ice cream cone |

B) Data sheet as shown in Appendix A.

## Phase III

### Part 1 - Instructional Materials

A) The following object or action pictures were presented on one of eight worksheets:

glass
goat
read
cup
mitten
window
doctor
mailman
buy
snow
nurse
drive
roll
boat
pour
bounce
wagon
bus
numbers
water
hat
rain
fall
wash
girl
pencil
policeman
run
walk
watermelon
banana
pig
nut
radio
rope
gum
rug
fight
fire
finger
pumpkin
next
bird
necklace
needle
farmer
ring
mix
pop
pan
pear
house
witch
milk
mop
bus
boy

B) Data sheet as shown in Appendix A.

### Part 2 - Instructional Materials

A) Eight worksheets, each containing three printed sentences with one underlined word and four object or action pictures above each sentence, were as follows:

| | | sentences | pictures |
|---|---|---|---|
| Set 1: | 1. | I drink with the glass. | glass, goat, read, cup |
| | 2. | The mailman will come to my house. | mitten, window, doctor, mailman |
| | 3. | I will bounce the ball. | roll, boat, pour, bounce |
| | 4. | I will ride in the wagon. | wagon, bus, numbers, water |
| | 5. | See the policeman ride in the car. | girl, pencil, numbers, policeman |
| | 6. | The girl will run to the house. | run, bounce, walk, read |
| Set 2: | 1. | I cut my finger. | fire, finger, pumpkin, run |
| | 2. | The nest is in the tree. | nest, bird, numbers, window |
| | 3. | The girl will pour the cereal and milk. | ring, mix, pour, pop |
| | 4. | Let's eat the banana. | boat, watermelon, banana, mitten |

| | sentences | pictures |
|---|---|---|
| | 5. A goat is a farm animal. | goat, pig, gum, bounce |
| | 6. Daddy will read with me. | mitten, read, rug, right |
| Set 3: | 1. Turn on the radio. | bounce, water, radio, rope |
| | 2. The farmer rides on the tractor. | farmer, boy, fire, glass |
| | 3. I wash the car. | drive, wash, walk, pour |
| | 4. I will put on the mitten. | pumpkin, mop, mitten, necklace |
| | 5. The bus is fun to ride in. | bus, banana, wagon, pour |
| | 6. He will fall on the floor. | finger, nurse, walk, fall |
| Set 4: | 1. I like to eat the pear. | pan, banana, pear, house |
| | 2. The water is good to drink. | water, witch, milk, run |
| | 3. I will buy the cereal and marshmallows. | mix, buy, bat, ring |
| | 4. I put on the necklace. | ring, meet, necklace, mop |
| | 5. The rain will come down outside. | snow, rain, radio, needle |
| | 6. I will fight with the boy. | fire, read, fight, mitten |

B) Data sheet is shown in Appendix A.

## Instructional Strategy

### Teaching Arrangement

Ss were seated in a semi-circle facing the teacher (T). $S_1$ was seated in a wheelchair with a fitted lapboard. $S_2$ was seated in a wheelchair at a wheelchair table. $S_3$ was seated in a common stationary chair with a lapboard resting on his legs. These arrangements remained constant throughout Phases I, II and III.

### Measurement Design

The following design was used to obtain a) baseline measures of responses to the questions and directives and b) measures of the acquisition of required responses:

A. Measure Phase I, Parts 1 through 9 consecutively;
B. Measure Phase II, Parts 1 through 6 consecutively;
C. Measure Phase III, Parts 1 and 2 consecutively;

D. Teach Phase I, Parts 1 through 9 consecutively (if necessary);
E. Teach Phase I, Parts 1 through 9 consecutively (if necessary);
F. Measure Phase III, Parts 1 and 2 consecutively;
G. Teach Phase III, Parts 1 and 2 consecutively (if necessary).

## Baseline and Teaching Procedures

Phase I: When students are presented with a printed word that they cannot label and four pictures that represent objects and actions with differing initial consonant sounds, they will determine the label of the unknown word by finding and labeling the picture which represents the object or action with the same initial consonant sound.

Baseline Procedures: Accuracy when responding to questions or directives was determined in the following manner: T presented $S_1$ with appropriate materials (M) and questions (Q) or directives (D) (e.g., Part 1: M = picture of a lamp; Q = "What is this?"). T gave no indication of correctness to $S_1$ but recorded a "+" on her data sheet for a correct response and a "-" on her data sheet for an incorrect response. T then presented $S_2$ with appropriate materials and questions or directives (e.g., Part 1: M = picture of a mouse; Q = "What is this?"). T proceeded until each S had two opportunities to respond to the materials and questions or directives appropriate for each part of Phase I. The reader interested in the specific materials used in each Part is referred to the Instructional Materials section above. The reader interested in the specific questions or directives issued in each Part is referred to the Teaching Procedures section below.

Teaching Procedures: The following teaching procedures were implemented if an S did not respond correctly on 2 consecutive occasions to any of the questions or directives issued when baseline measures were obtained.

Part 1 - Teaching students to label object pictures and describe action pictures.

Step 1: An object picture or action picture was held up in front of $S_1$. T then said, "What is this?" (for object pictures) or "What is the (boy) doing?" (for action pictures). If $S_1$ labeled the object picture or described the action picture correctly, T praised $S_1$ and recorded a "+" on her data sheet. T then held up a different picture in front of $S_2$ and repeated the procedure described above.

Step 2a: If $S_1$ did not label an object picture correctly, T said, "No, this is a (lamp). What is this?" When $S_1$ imitated T's object picture label, T praised $S_1$ but recorded a "-" on her data sheet. T then held up a different picture in front of $S_2$, etc.

Step 2b: If $S_1$ did not describe an action picture correctly, T said, "No, this (boy) is (running). What is this (boy) doing?" When $S_1$ imitated T's action picture description, T praised $S_1$ but recorded a "-" on her data sheet. T then held up a different picture in front of $S_2$, etc.

These procedures were followed until each S, on 2 consecutive occasions and without assistance from T, labeled the object pictures and described the action pictures they did not label or describe correctly when baseline measures were obtained.

Part 2 - Teaching students to sound consonants presented on flashcards.

Step 1: A flashcard displaying 1 of 8 consonants was held up in front of $S_1$. T then said, "What is the sound of this letter?" If $S_1$ sounded the consonant correctly, T praised $S_1$ and recorded a "+" on her data sheet. T then held up a different consonant in front of $S_2$ and repeated the procedure described above.

Step 2: If $S_1$ did not sound the consonant correctly, T said, "No, the sound of this letter is (bb). What is the sound of this letter?" When $S_1$ imitated T's consonant sound, T praised $S_1$ but recorded a "-" on her data sheet. T then held up a different consonant in front of $S_2$, etc.

Step 3: If T considered $S_1$'s imitation of the given consonant sound incoherent, T said, "Watch my mouth." T made the sound. T then said, "Now you try it." When $S_1$ produced a closer approximation of the required consonant sound, T praised $S_1$ but recorded a "-" on her data sheet. T then held up a different consonant in front of $S_2$, etc.

These procedures were followed until each S, on 2 consecutive occasions and without assistance from T, sounded 2 sets of 4 consonants correctly.[6]

Part 3a - Teaching students to touch the first letter (color-coded) in printed words.

Step 1: A printed word with the first letter color-coded was placed on $S_1$'s tray. T then said, "Touch the first letter in this word." If $S_1$ touched the first letter, T praised $S_1$ and recorded a "+" on her data sheet. T then placed a different printed word with the first letter color-coded on $S_2$'s wheelchair table and repeated the procedure described above.

Step 2: If $S_1$ did not touch the first letter in the printed word, T said, "No, touch the first letter." and modeled the correct response. T then repeated the original directive, "Touch the first letter in this word." When $S_1$ imitated T's model, T praised $S_1$ but recorded a "-" on her data sheet. T then placed a different printed word with the first letter color-coded on $S_2$'s wheelchair table, etc.

These procedures were followed until each S, on 2 consecutive occasions and without assistance from T, touched the first letter in 2 sets of 4 color-coded printed words correctly.

Part 3b - Teaching students to touch the first letter (not color-coded) in printed words.

The procedures implemented and the criterion established in Part 3b were identical to those described in Part 3a. The materials differed slightly in that the first letters in printed words were not color-coded in Part 3b.

Part 4 - Teaching students to sound initial consonants in selected printed words.

Step 1: A printed word with 1 of 8 initial consonant sounds was placed on $S_1$'s tray. T then said, "What is the first sound in this word?" If $S_1$ sounded the initial consonant correctly, T praised $S_1$

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[6] Due to the physical handicaps of the students, exact consonant sound productions were sometimes physically impossible. In such cases T considered responses correct if: a) S's consonant sound approximation was consistently emitted and b) T was satisfied that S's production was the closest possible approximation.

and recorded a "+" on her data sheet. T then placed a printed word with a different initial consonant sound on $S_2$'s wheelchair table and repeated the procedures described above.

Step 2: If $S_1$ did not correctly sound the initial consonant of the given printed word, T said, "Touch the first letter in this word." When $S_1$ touched the first letter, T said, "What is the sound of that letter?" If $S_1$ sounded the initial consonant correctly, T repeated the original question, "What is the first sound in this word?" When $S_1$ repeated the consonant sound, T praised $S_1$ but recorded a "-" on her data sheet. T then placed a printed word with a different initial consonant sound on $S_2$'s wheelchair table, etc.

Step 3: When $S_1$ touched the first letter in the printed word but did not correctly sound that consonant, T said, "No, the sound of that letter is (bb). What is the sound of that letter?" When $S_1$ imitated T's consonant sound model, T repeated the original question, "What is the first sound in this word?" When $S_1$ repeated the initial consonant sound, T praised $S_1$ but recorded a "-" on her data sheet. T then placed a printed word with a different initial consonant sound on S's wheelchair table, etc.

These procedures were followed until each S, on 2 consecutive occasions and without assistance from T, sounded the initial consonants in 2 sets of 8 printed words.

Part 5 - Teaching students to label object pictures, to describe action pictures and to make the initial consonant sounds of the objects and actions represented in the pictures (e.g., Q - "What is this?" A - "(ball)" or Q - "What is the (boy) doing?" A - "(running)" Q - "What is the first sound in (running)?").

Step 1: A picture representing an object or action with 1 of 8 initial consonant sounds was held up in front of $S_1$. T then said, "What is this?" (for object picture) or "What is the (boy) doing?" (for action picture). When $S_1$ labeled the object picture or described the action picture, T said, "What is the first sound in ( boy )?" If $S_1$ made the correct initial consonant sound, T praised $S_1$ and recorded a "+" on her data sheet. T then held up a picture representing an object or action with a different initial consonant sound in front of $S_2$ and repeated the procedure described above.

Step 2: If $S_1$ did not make the correct initial consonant sound of the object or action represented in the picture, T said, "No, listen to the first sound in (boy)." T repeated (boy) while exaggerating its initial sound and then repeated the original question, "What is the first sound in (boy)?" If $S_1$ made the correct initial consonant sound, T praised $S_1$ but recorded a "-" on her data sheet. T then held up a picture representing an object or action with a different initial consonant sound in front of $S_2$, etc.

Step 3: If $S_1$ still did not make the correct initial consonant sound of the object or action represented in the picture, T said, "No, the first sound in (boy) is (bb)." T then repeated the original question, "What is the first sound in (boy)?" When $S_1$ imitated T's consonant sound model, T praised $S_1$ but recorded a "-" on her data sheet. T then held up a picture representing an object or action with a different initial consonant sound in front of $S_2$, etc.

These procedures were followed until each S, on 2 occasions and without assistance from T, made the initial consonant sounds of 2 sets of 8 objects and actions represented in pictures.

Part 6 - Teaching students to label object pictures, to describe action pictures and to make the initial consonant sounds of the objects and actions represented in those pictures (e.g., Q - "What is this?" A - "(ball)" Q - "What is the first sound in that word?" or Q - "What is the (boy) doing?" A - "(running)" Q - "What is the first sound in that word?").

Step 1: A picture representing an object or action with 1 of 8 initial consonant sounds was held up in front of $S_1$. T then said, "What is this?" (for object picture) or "What is the (boy) doing?" (for action picture). When $S_1$ labeled the object picture or described the action picture, T said, "What is the first sound in that word?" If $S_1$ made the correct initial consonant sound, T praised $S_1$ and recorded a "+" on her data sheet. T then held up a picture representing an object or action with a different initial consonant sound in front of $S_2$ and repeated the procedure described above.

If $S_1$ did not make the correct initial consonant sound of the object or action represented in the picture, the procedures implemented and the established criterion were identical to those described in Part 5 with the following exception: a "-" was recorded on the data sheet for all responses emitted by $\underline{S}_1$.

### Part 7 - Teaching students to make the initial consonant sounds of objects and actions represented in pictures (e.g., "What is the first sound in this?").

Step 1: A picture representing an object or action with 1 of 8 initial consonant sounds was held up in front of $\underline{S}_1$. $\underline{T}$ then said, "What is the first sound in this?" If $\underline{S}_1$ made the correct initial consonant sound, $\underline{T}$ praised $\underline{S}_1$ and recorded a "+" on her data sheet. $\underline{T}$ then held up a picture representing an object or action with a different initial consonant sound in front of $\underline{S}_2$ and repeated the procedure described above.

If $\underline{S}_1$ did not make the correct initial consonant sound of the object or action represented in the picture, the procedures implemented and the established criterion were identical to those described in Part 6 and Part 5 consecutively with the following exception: a "-" was recorded on the data sheet for all responses emitted by $\underline{S}_1$.

### Part 8 - Teaching students to touch the appropriate object or action picture in response to a consonant sound stated by the teacher (e.g., "Touch the thing that begins with (bb).").

Step 1: Four pictures representing objects or actions with different initial consonant sounds were placed on $\underline{S}_1$'s tray. $\underline{T}$ then said, "Touch the thing that begins with (bb)." If $\underline{S}_1$ touched the correct picture, $\underline{T}$ praised $\underline{S}_1$ and recorded a "+" on her data sheet. $\underline{T}$ then placed 4 object or action pictures on $\underline{S}_2$'s wheelchair table and repeated the procedure described above.

Step 2: If $\underline{S}_1$ did not touch the picture representing the object or action with the initial consonant sound made by $\underline{T}$, $\underline{T}$ said "No" and pointed to each picture saying, "What is the first sound in (ball)?" etc. When $\underline{S}_1$ made the 4 initial consonant sounds, $\underline{T}$ repeated the original directive, "Touch the thing that begins with (bb)." If $\underline{S}_1$ touched the correct picture, $\underline{T}$ praised $\underline{S}_1$ but recorded a "-" on her data sheet. $\underline{T}$ then placed 4 object or action pictures on $\underline{S}_2$'s wheelchair table, etc.

Step 3: If $\underline{S}_1$ still did not touch the picture representing the object or action with the initial consonant sound stated by T, T modeled the correct response and said, "(Ball) begins with (bb)." T then repeated the original directive, "Touch the picture that begins with (bb)." When $S_1$ touched the correct picture, T praised $S_1$ but recorded a "-" on her data sheet. T then placed 4 object or action pictures on $S_2$'s wheelchair table, etc.

These procedures were followed until each S, on 2 consecutive occasions and without assistance from T, correctly touched each of 2 sets of 8 object or action pictures in response to consonant sounds stated by T.

Part 9 - When students are presented with a printed word that they cannot label and four pictures that represent objects and actions with differing initial consonant sounds, they will determine the label of the unknown word by finding and labeling the picture which represents the object or action with the same initial consonant sound.

Step 1: $S_1$ was presented with 4 pictures representing objects and actions with differing initial consonant sounds and one printed word which she could not label, but which named 1 of the 4 given objects or actions. T then touched the appropriate materials and said, "This word names one of these things. What is this word?" If $S_1$ labeled the printed word by finding and labeling the picture which represented the object or action with the same initial consonant sound, T praised $S_1$ and recorded a "+" on her data sheet. T then presented $S_2$ with 4 object or action pictures and a different printed word and repeated the procedures described above.

Step 2: If $S_1$ did not label the printed word by finding and labeling the picture which represents the object or action with the same initial consonant sound, T pointed to the printed word and said, "What is the first sound in that word?" When $S_1$ sounded its initial consonant T said, "Touch the thing that begins with (bb). What is that?" When $S_1$ touched and labeled the correct picture, T repeated the original cue while touching the appropriate materials. "This word names one of these things. What is this word?" If $S_1$ correctly labeled the printed word, T praised $S_1$ but recorded a "-" on her data sheet. T then presented $S_2$ with 4 object or action pictures and a different printed word, etc.

Step 3: If $S_1$ still did not label the printed word by finding and labeling the picture which represents the object or action with the same initial consonant sound, T again pointed to the printed word and said, "What is the first sound in that word?" When $S_1$ sounded its initial consonant, T again said, "Touch the thing that begins with (bb)." "What is that?" When $S_1$ touched and labeled the correct picture, T said, "This word begins with (bb). (Ball) begins with (bb). This word is (ball). What is this word?" When $S_1$ imitated T's model and labeled the printed word, T praised $S_1$ but recorded a "-" on her data sheet.

These procedures were followed until each S, on 2 consecutive occasions and without assistance from T, correctly labeled each of 2 sets of 8 unknown words by finding and labeling the pictures which represented the objects or actions with the same initial consonant sounds.

Phase II: When students are presented with a worksheet containing sentences composed of words they can label but which are missing one word in the subject, verb or object position (e.g., The _____ hit the ball. The boy _____ the ball. The boy hit the _____.) and three printed words above each sentence, they will mark the one word that logically completes the sentence.

Baseline Procedures: Phase II, Parts 1 through 5. The baseline procedures implemented were identical to those described in the Baseline Procedures section for Phase I given appropriate materials and questions or directives.

Teaching Procedures: The following teaching procedures were implemented if an S did not respond correctly on 2 consecutive occasions to any of the questions or directives issued when baseline measures were obtained.

Part 1 - Teaching students to label object pictures and describe action pictures.

The procedures implemented and the criterion established in Phase II, Part 1, were identical to those described in the Phase I, Part 1, Teaching Procedures section.

Part 2 - When students are presented with eight sets of two pictures, one component of each set depicting an absurd action (e.g., teacher combing hair with toothbrush) and the other component depicting a logical action (e.g., teacher combing hair with comb) and the question, "Does this picture make sense?", they will respond "yes" to pictures of logical actions and "no" to pictures of absurd actions.

Prior to implementing the procedures described in Step 1 through 2b below, T asked S's a number of questions which directed them to label selected objects and describe actions depicted in the pictures (e.g., *Picture*: Diane brushing her hair with a toothbrush. *Questions*: "What does Diane have in her hand? What is she doing with it?"). *T* gave no indication as to the logic or absurdity of the descriptions. *T* asked these questions to insure that *Ss* would attend to the pertinent details of the action depicted in each picture when determining its logic or absurdity. Each *S* was asked only once to reply to questions about a particular picture. In rare cases where an *S* gave an incorrect response, *T* supplied the correct response immediately.

*Step 1*: A logical or absurd picture was held up in front of $S_1$. *T* then said, "Does this picture make sense?" If $S_1$ responded correctly by saying "yes" if the picture was logical or "no" if the picture was absurd, *T* praised $S_1$ and recorded a "+" on her data sheet. *T* then said, "Why does (doesn't) this picture make sense?" and if necessary asked questions which helped to shape $S_1$'s explanation (e.g., *Picture*: Diane brushing her hair with a toothbrush. *Example questions and answers*: Q - "Why doesn't this picture make sense?" A - "Don't comb hair with toothbrush." Q - "What do you comb hair with?" A - "comb" Q - "What do you brush with a toothbrush?" A - "teeth"). *T* then held up a different logical or absurd picture in front of $S_2$ and repeated the procedure described above.

*Step 2a*: If $S_1$ did not respond correctly but said "yes" when the picture was absurd, *T* asked $S_1$ questions whose answers would formulate the logic of a correct response to the original question (e.g., *Picture*: Diane combing her hair with a toothbrush. *Example questions and answers*: Q - "What does Diane have in her hand?" A - "toothbrush" Q - "What is she doing with the toothbrush?" A - "combing hair" Q - "Do you comb your hair with a toothbrush?" A - "no" Q - "What do you comb your hair with?" A - "a comb" Q - "What do you do with a toothbrush?" A - "brush teeth"). *T* then repeated the original question, "Does this picture make sense?" If $S_1$ responded, "no," *T* praised $S_1$ but recorded a "-" on her data sheet. *T* then held up a different logical or absurd picture in front of $S_2$, etc.

*Step 2b*: If $S_1$ did not respond correctly and said "no" when the picture was logical, *T* asked $S_1$ questions whose answers would formulate the logic of a correct response to the original question (e.g., *Picture*: Diane combing her hair with a comb. *Example questions and answers*: Q - "What does Diane have in her hand?" A - "a comb" Q - "What is she doing with the comb?" A - "combing hair" Q - "Do you use a comb to comb your hair?" A - "yes"). T then repeated the original question, "Does this picture make sense?" If $S_1$ responded, "yes," T praised $S_1$ but recorded a "-" on her data sheet. T then held up a different logical or absurd picture in front of $S_2$, etc.

Step 3: If $S_1$ still did not respond correctly but said "no" when the picture was logical or "yes" when the picture was absurd, T modeled the correct response and stated the reason for her response (e.g., Picture: Diane combing her hair with a toothbrush. T said, "No, this picture does not make sense. You do not comb your hair with a toothbrush. You comb your hair with a comb." or Picture: Diane combing hair with a comb. T said, "Yes, this picture makes sense. You use a comb to comb your hair."). T then repeated the original question, "Does this picture make sense?" When $S_1$ imitated T's correct yes/no response, T praised $S_1$ but recorded a "-" on her data sheet. T then held up a different logical or absurd picture in front of $S_2$, etc.

These procedures were followed until each S, on 2 consecutive occasions and without assistance from T, identified each of 2 sets of 8 pictures as either logical or absurd by saying "yes" to pictures of logical actions and "no" to pictures of absurd actions.

Part 3 - When students are read sentences which are logical or absurd following the question, "Does this sentence make sense?", they will respond "yes" to logical sentences and "no" to absurd sentences.

Step 1: T said to $S_1$, "Does this sentence make sense?" and then read a logical or absurd sentence. If $S_1$ responded correctly by saying "yes" if the sentence was logical or "no" if the sentence was absurd, T praised $S_1$ and recorded a "+" on her data sheet. T then said, "Why does (doesn't) this sentence make sense?" and read the logical or absurd sentence again. If necessary, T asked questions which helped to shape $S_1$'s explanation (e.g., Sentence: We eat clothes for dinner. Example questions and answers: Q - "What do you eat for dinner?" A - "spaghetti, hamburgers, etc." Q - "Do you eat clothes for dinner?" A - "No, I wear clothes.").

T then read a different logical or absurd sentence to $S_2$ and repeated the procedures described above.

Step 2a: If $S_1$ did not respond correctly and said "yes" when the sentence was absurd, T asked $S_1$ questions whose answers would formulate the logic of a correct response to the original question (e.g., Sentence: "We eat clothes for dinner." Example questions and answers: Q - "What do you eat for dinner?" A - "hamburgers" Q - "Do you ever eat your clothes for dinner?" A - "no" Q - "What do you do with your clothes?" A - "wear them"). T then repeated the original question, "Does this sentence make sense?" and read the sentence again. If $S_1$ responded "no" T praised $S_1$ but recorded a "-" on her data sheet. T then read a different logical or absurd sentence to $S_2$, etc.

Step 2b: If $S_1$ did not respond correctly and said "no" when the sentence was logical, T asked $S_1$ questions whose answers would formulate the logic of a correct response to the original question (e.g., Sentence: We eat food for dinner. Example questions and answers: Q - "What do you eat for dinner?" A - "spaghetti" Q - "What else do you eat for dinner?" A - "hamburgers." Q - "Are hamburgers and spaghetti food?" A - "yes" Q - "Do you eat food for dinner?" A - "yes"). T then repeated the original question, "Does this sentence make sense?" and read the sentence again. If $S_1$ responded "yes," T praised $S_1$ but recorded a "-" on her data sheet. T then read a different logical or absurd sentence to $S_2$, etc.

Step 3: If $S_1$ still did not respond correctly but said "no" when the sentence was logical or "yes" when the sentence was absurd, T modeled the correct response and stated the reason for her response (e.g., Sentence: We eat clothes for dinner. T said, "No, this sentence does not make sense. We do not eat clothes for dinner. We eat food for dinner." or Sentence: We eat food for dinner. T said, "Yes, this picture makes sense. We eat food for dinner."). T then repeated the original question, "Does this sentence make sense?" and read the sentence again. When $S_1$ imitated T's correct yes/no response, T praised $S_1$ but recorded a "-" on her data sheet. T then read a different logical or absurd sentence to $S_2$, etc.

These procedures were followed until each S, on 2 consecutive occasions and without assistance from

T, identified each of 2 sets of 6 sentences as either logical or absurd by saying "yes" to sentences describing logical actions and "no" to sentences describing absurd actions.

Part 4a - When students are presented with a printed sentence read by the teacher with one word missing in the object position (e.g., The boy hit the _____.) and three object pictures, they will touch the one picture that represents the object which logically completes the sentence.

Step 1: A printed sentence with one word missing in the object position and 3 object pictures were placed on $S_1$'s tray. T touched the empty space in the sentence and said, "This sentence is missing one word." T then touched each of the 3 pictures and said, "One of these pictures makes sense in the sentence. I am going to read the sentence. You touch the picture that makes sense in the sentence." T then read aloud the incomplete sentence. If $S_1$ touched the picture that represented the object which logically completed the sentence, T praised $S_1$ and recorded a "+" on her data sheet. T then placed a different printed sentence with one word missing in the object position and 3 object pictures on $S_2$'s wheelchair table and repeated the procedures described above.

Step 2: If $S_1$ touched a picture that did not represent the object which logically completed the sentence, T said "no" and questioned $S_1$ on the logic of her picture choice (e.g., Sentence: We drink _____. Pictures: ball, bed, milk. If $S_1$ responded incorrectly by touching (ball), questions and answers similar to the following might occur: Q - "Can you drink a ball?" A - "no" Q - "What can you do with a ball?" A - "throw it"). T then repeated part of the original directive, "I am going to read the sentence. You touch the picture that makes sense in the sentence," and read aloud the incomplete sentence. If $S_1$ touched the picture that represented the object which logically completed the sentence, T praised $S_1$ but recorded a "-" on her data sheet. T then placed a different printed sentence with one word missing in the object position on $S_2$'s wheelchair table, etc.

Step 3: If $S_1$ still touched a picture that did not represent the object which logically completed the sentence, T said "no' and asked $S_1$ questions whose answers would formulate the logic of a correct response to the original question (e.g., Sentence: We drink ____. Pictures: ball, bed, milk. If $S_1$ responded incorrectly by touching bed, questions and answers similar to the following might occur: Q - "Can you drink a bed?" A - "no" Q - "What can you do in a bed?" A - "sleep" Q - "Can you drink a ball?" A - "no" Q - "What can you do with a ball?" A - "throw it" Q - "Can you drink milk?" A - "yes"). T then repeated part of the original directive, "I am going to read the sentence. You touch the picture that makes sense in the sentence," and read aloud the incomplete sentence. If $S_1$ touched the picture that represented the object which logically completed the sentence, T praised $S_1$ but recorded a "-" on her data sheet. T then placed a different printed sentence with one word missing in the object position on $S_2$'s wheelchair table, etc.

Step 4 - If $S_1$ still touched the incorrect picture, T said, "no," read aloud the incomplete sentence and modeled the correct response by touching the picture that represented the object which logically completed the sentence. T then repeated part of the original directive, "I am going to read the sentence. You touch the picture that makes sense in the sentence," and read aloud the incomplete sentence. When $S_1$ imitated T's model by touching the correct picture, T praised $S_1$ but recorded a "-" on her data sheet. T then placed a different printed sentence with one word missing in the object position and 3 object pictures on $S_2$'s wheelchair table, etc.

These procedures were followed until each S, on 2 consecutive occasions and without assistance from T, touched the picture that represented the object which logically completed each of 2 sets of 6 printed sentences.

Part 4b - When students are presented with a printed sentence read by the teacher with one word missing in the verb position (e.g., The boy ____ the ball.) and three action pictures, they will touch the one picture that represents the subject which logically completes the sentence.

The procedures implemented and the criterion established in Part 4b were identical to those described in Part 4a. The materials differed slightly in 4b in that each of the printed sentences was missing a word in the verb position and action pictures were utilized.

Part 4c - When students are presented with a printed sentence read by the teacher with one word missing in the subject position (e.g., The ______ hit the ball) and three object pictures, they will touch the one picture that represents the subject which logically completes the sentence.

The procedures implemented and the criterion established in Part 4c were identical to those described in Part 4a. The materials differed slightly in 4b in that each of the printed sentences was missing a word in the subject position.

Part 4d - When students are presented with a printed sentence read by the teacher with one word missing in either the subject, verb or object position (e.g., The ______ hit the ball. The boy ______ the ball. The boy hit the ______.) and three object or action pictures, they will touch the one picture that represents the subject, verb or object which logically completes the sentence.

The procedures implemented and the criterion established in Part 4d were identical to those described in Part 4a. The materials differed slightly in 4d in that each of the printed sentences was missing a word in the subject, verb or object position and both object and action pictures were utilized.

Part 5 - When students are presented with a printed sentence read by the teacher with one word missing in the subject, verb or object position (e.g., The ______ hit the ball. The boy ______ the ball. The boy hit the ______.) and three printed words, they will touch the one word that logically completes the sentence.

The procedures implemented and the criterion established in Part 5 were identical to those described in Part 4a with the following exception: In Part 5 Ss were asked to touch the printed word from a set of 3 which logically completed the sentence. The materials differed slightly in Part 5 in that each of the printed sentences was missing a word in the subject, verb or object position.

Baseline Procedures: Phase II, Part 6. Accuracy when completing each worksheet was determined in the following manner: Ss 1, 2 and 3 were seated facing T. T presented each S with a worksheet containing 6 sentences, each sentence missing a word in the subject, verb or object position and with 3 printed words above each sentence. T then presented Ss 1, 2 and 3 with the multiple directives described in the Teaching Procedures section below. T then walked away allowing each S to complete his/her worksheet independently. As each S completed his/her worksheet, T collected each worksheet and gave the Ss no indication of response correctness. T recorded a "+" on her data sheet for each correct word choice and a "-" for each incorrect word choice. T proceeded until each S had 2 opportunities to complete each of the 4 worksheets.

Teaching Procedures: The following teaching procedures were implemented if an S did not respond correctly on 2 consecutive occasions to any of the questions or directives issued when baseline measures were obtained.

Part 6 - When students are presented with a worksheet containing sentences composed of words they can label but which are missing one word in the subject, verb or object position (e.g., The ______ hit the ball. The boy ______ the ball. The boy hit the ______.), and three printed words above each sentence, they will mark the one word that logically completes the sentence.

Prior to implementing Steps 1 through 5 below, T directed Ss to a) label the words composing the sentences on the worksheet and b) label the 3 printed words above each sentence. Each word contained on the worksheet had been previously learned by Ss 1, 2 and 3 in their daily reading program. T directed Ss to alternate turns reading the sentences until each word on the worksheet was labeled once. While $S_1$ read a given sentence, $S_2$ and $S_3$ followed visually while touching underneath each word, etc. If an S did not correctly label a word, T immediately supplied the correct label. No data was taken. By implementing this procedure, T insured that for the most part, Ss could label the words they had forgotten, and for that reason, inability to label given words would not significantly interfere with the skill being taught.

Step 1: A worksheet containing 6 sentences, each missing a word in the subject, verb or object position, with 3 printed words above each sentence and a pencil were placed in front of each S. After all words on the worksheet were labeled by Ss as described above, T said, "Put your finger on number 1. Good. Now put your finger on the empty space in that sentence. Good. Each sentence is missing a word. Now put your finger on the words above the empty space. One of those words makes sense in the sentence. You read each sentence and then read the 3 words above it. You mark the word that makes sense in the sentence." T gave any S physical assistance if that S was unable to follow the given directions. T then walked away and allowed each S to complete his/her worksheet independently.

Step 2: When $S_1$ raised her hand, T sat down next to her and said, "Read sentence number 1 and say the word you have marked." If $S_1$ marked the word which logically completed the sentence and thus labeled the words of a logical sentence, T praised $S_1$ and recorded a "+" on her data sheet. T followed the same procedures for the remaining correct word choices. If $S_1$ marked the correct word for each of the sentences, T printed a word, praising $S_1$'s performance on her worksheet (e.g., "Good, great, fantastic"). When $S_2$ raised her hand, T then sat down next to her and repeated the procedures described above.

Step 3: If $S_1$ did not mark the word which logically completed the sentence and thus labeled the words of an absurd sentence, T said, "no" and questioned $S_1$ on the logic of her word choice (e.g., Sentence: The _____ is good to eat. Words: house, marshmallow, play. If $S_1$ responded incorrectly by marking the word (house), questions and answers similar to the following might occur: Q - "Do you eat your house?" A - "no" Q - "What's a house for?" A - "live in it"). T then repeated part of the original directive, "Read the sentence and mark the word that makes sense in the sentence." If $S_1$ marked the word which logically completed the sentence and thus labeled the words of a logical sentence, T praised $S_1$ but recorded a "-" on her data sheet. T followed the same procedure for the remaining incorrect choices. When $S_2$ raised her hand, T then sat down next to her, etc.

Step 4: If $S_1$ still did not mark the word which logically completed the sentence and thus labeled the words of an absurd sentence, T said "no" and asked questions whose answers would formulate the logic of the correct word choice (e.g., Sentence The _____ is good to eat. Words: house, marshmallow, play. If $S_1$ responded incorrectly by marking the word (play), questions and answers similar to the following might occur: Q - "Can you eat a play?" A - "no" Q - "Can you eat a house?" A - "no" Q - "What's a house for?" A - "live in it" Q - "Can you eat a marshmallow?" A - "yes"). T then repeated part of the original directive, "Read the sentence and mark the word that makes sense in the sentence." If $S_1$ marked the word which logically completed the sentence and thus labeled the words of a logical sentence, T praised $S_1$ but recorded a "-" on her data sheet. When $S_2$ raised her hand, T then sat down next to her, etc.

Step 5: If $S_1$ still did not mark the word which logically completed the sentence and thus labeled the words of an absurd sentence, T said "no" and modeled the correct response by a) reading aloud the incomplete sentence; b) reading aloud the 3 printed words; and c) marking the correct word. T then said, "You read the sentence and say the word that makes sense." When $S_1$ labeled the words of the logical sentence, T praised $S_1$ but recorded a "-" on her data sheet. When $S_2$ raised her hand, T then sat down next to her, etc.

These procedures were followed until each S, on 2 occasions and without assistance from T, marked the words which logically completed the 6 sentences on each of 4 worksheets.

Phase III: When students are presented with a worksheet containing sentences composed of words they can label with the exception of one underlined word in the subject, verb or object position and four pictures above each sentence, they will determine the label of the underlined word by marking and labeling the one picture which represents the object or action a) with the same initial consonant sound as the underlined word and b) which logically completes the sentence.

Baseline Procedures: Phase III, Part 1. The baseline procedures implemented were identical to those described in the Baseline Procedures section for Phase I, given appropriate materials and questions or directives.

Teaching Procedures: The following teaching procedures were implemented if an S did not respond correctly on 2 consecutive occasions to any of the questions or directives issued when baseline measures were obtained.

Part 1 - Teaching students to label objects, pictures and describe action pictures as they are presented on worksheets.

The procedures implemented and the criterion established in Phase III, Part 1 were identical to those described in the Phase I, Part 1 Teaching Procedures section with the following exception.

pictures were displayed on worksheets which were placed on the table or tray of each S, rather than held up in front of them.

Baseline Procedures: Phase III, Part 2. The baseline procedures implemented were identical to those described in the Baseline Procedures section for Phase II, Part 6. The materials differed in that 8 worksheets each displaying 3 sentences were presented in Phase II, Part 2. Above each sentence were 4 object or action pictures rather than printed words.

Teaching Procedures: The following teaching procedures were implemented if an S did not respond correctly on 2 consecutive occasions to any of the questions or directives when baseline measures were obtained.

Part 2 - When students are presented with a worksheet containing sentences composed of words they can label with the exception of one underlined word in the subject, verb or object position, and four pictures above each sentence, they will determine the label of the underlined word by marking and labeling the one picture which represents the object or action a) with the same initial consonant sound as the underlined word and b) which logically completes the sentence.

Prior to implementing Steps 1 through 5 below, T directed Ss to label the words composing the sentences on the worksheet with the exception of the underlined words. Each word contained on the worksheet with the exception of the underlined words had been previously learned by Ss 1, 2 and 3 in their daily reading program. T directed Ss to alternate turns reading the sentences until each word not underlined on the worksheet was labeled once. While $S_1$ read a given sentence, $S_2$ and $S_3$ followed visually while touching underneath each of the words, etc. If any S labeled a word incorrectly, T immediately supplied the correct label. No data was taken. By implementing this procedure, T insured that Ss, for the most part, could label the words they had forgotten and for that reason, inability to label given words would not significantly interfere with the skill being taught.

Step 1: A worksheet containing 3 sentences, each with one underlined word that Ss had not previously learned and 4 pictures above it was placed in front of each S with a pencil. After all words not underlined on the worksheet were labeled by Ss as described above, T said, "Put your finger on number 1. Good. Now put your finger on the underlined word in that sentence. Good. There are 4 pictures above that word. Touch them. The underlined word is one of those pictures. You mark the picture that has the same first sound as the underlined word and makes sense in the sentence." *T* gave any *S* physical assistance if that *S* was unable to follow the given directions. *T* then walked away and allowed each *S* to complete his/her worksheet independently.

*Step 2*: When $S_1$ raised her hand, *T* sat down next to her and said, "Read sentence number 1 and say the underlined word." If $S_1$ correctly labeled the underlined word by marking and labeling the picture which represented the object or action a) with the same initial consonant sound as the underlined word and b) which logically completed the sentence, *T* praised $S_1$ and recorded a "+" on her data sheet. *T* followed the same procedure for the remaining correct responses. If $S_1$ marked and labeled the correct picture for each of the underlined words, *T* printed a word praising $S_1$'s performance on her worksheet (e.g., good, great, fantastic, etc.). When $S_2$ raised her hand, *T* then sat down next to her and repeated the procedures described above.

*Step 3*: If $S_1$ did not correctly label the underlined word but marked and labeled a picture which represented an object or action a) which did not have the same initial consonant sound as the underlined word and/or b) which did not logically complete the sentence, *T* questioned $S_1$ on the logic and initial consonant sound of her picture choice (e.g., *Sentence*: I will *bounce* the ball. *Pictures*: roll boat, pour, bounce. If $S_1$ responded incorrectly by marking the picture of the (*boat*), questions and answers similar to the following might occur: Q - "What is the first sound in this word?" (*T* touches underlined word) A - "(bb)" Q - "What is the first sound in (*boat*)?" A - "(bb)" Q - "Is that the same sound?" A - "yes" Q - "Can you boat a ball?" A - "no"). *T* then said, "Read the sentence again," and repeated part of the original directive, "Mark the picture that has the same first sound as the underlined word and makes sense in the sentence." If $S_1$ marked the correct picture, *T* said, "Now read the sentence and say the underlined word." If $S_1$ correctly labeled the underlined word, *T* praised $S_1$ but recorded a "-" on her data sheet sentence. *T* followed the same procedure for the remaining incorrect responses. When $S_2$ raised her hand, *T* then sat down next to her, etc.

Step 4: If $S_1$ still did not correctly label the underlined word but again marked and labeled a picture which represented an object or action a) which did not have the same initial consonant sound as the underlined word and/or b) which did not logically complete the sentence, T questioned $S_1$ on the logic and initial consonant sound of each possible picture choice (e.g., Sentence: I will bounce the ball. Pictures: roll boat, pour, bounce. Example questions and answers: Q - "What is the first sound in this word? (T touches underlined word)" A - "(bb)" Q - "What is the first sound in (roll)?" A - "(rr)" Q - "Is that the same sound?" A - "no" Q - "Can you roll a ball?" A - "yes" Q - "What is the first sound in boat?" A - "(bb)" etc.). T then said, "Read the sentence again," and repeated part of the original directive, "Mark the picture that has the same first sound as the underlined word and makes sense in the sentence." If $S_1$ marked the correct picture, T said, "Now read the sentence and say the underlined word." If $S_1$ correctly labeled the underlined word, T praised $S_1$ but recorded a "-" on her data sheet. When $S_2$ raised her hand, T then sat down next to her, etc.

Step 5: If $S_1$ still did not correctly label the underlined word but again marked and labeled an incorrect picture, T said "no" and modeled the correct response by a) reading aloud the incomplete sentence; b) marking the correct picture; and c) reading the sentence and labeling the underlined word. T then gave a brief explanation of her choice (e.g., "This word begins with (bb). (Bounce) begins (bb) too. You can (bounce a ball)."). T then said, "You read the sentence and say the underlined word. When $S_1$ correctly labeled the underlined word, T praised $S_1$ but recorded a "-" on her data sheet. When $S_2$ raised her hand, T sat down next to her, etc.

These procedures were followed until each S, on 2 occasions and without assistance from T, marked the correct pictures for the 3 sentences on each of 8 worksheets.

## Results

Measures of each S's responses to questions and directives issued throughout each part of Phases I, II and III were obtained prior to teaching any of those responses. These measures are referred to as baseline measures. If an S did not respond correctly during baseline to all questions and directives issued in any part of Phases I, II or III, those parts were considered appropriate for subsequent instruction.

Measures of the acquisition of those responses made during instruction were recorded and referred to as teaching measures. The specific program design was as follows:

- A. Measure Phase I, Parts 1 through 9 consecutively;
- B. Measure Phase II, Parts 1 through 6 consecutively;
- C. Measure Phase III, Parts 1 and 2 consecutively;
- D. Teach Phase I, Parts 1 through 9 consecutively (if necessary);
- E. Teach Phase II, Parts 1 through 6 consecutively (if necessary);
- F. Measure Phase III, Parts 1 and 2 consecutively;
- G. Teach Phase III, Parts 1 and 2 consecutively (if necessary).

The following tables contain the specific performance patterns of Ss 1, 2 and 3. When reading these tables, the reader should note that Trials 1 and 2 refer to baseline measures and all subsequent trials refer to teaching measures. A criterion for correct responding was established for each part of Phases I, II and III. The assumption made was that an S could correctly perform a skill in a given part at an acceptable criterion when that S could correctly respond to all questions and directives on two consecutive occasions.

Table 1

Phase I, Part 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err.[7] | #Resp.[8] | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 13 | 48 | 1 | 18 | 48 | 1 | 6 | 48 |
| 2 | 14 | 48 | 2 | 18 | 48 | 2 | 5 | 48 |
| 3 | 1 | 14 | 3 | 3 | 18 | 3 | 1 | 6 |
| 4 | 0 | 14 | 4 | 2 | 18 | 4 | 1 | 6 |
| 5 | 0 | 14 | 5 | 0 | 18 | 5 | 0 | 6 |
| | | | 6 | 0 | 18 | 6 | 0 | 6 |

It should be noted when reading Table 1 that there is a difference between the number of possible responses when baseline measures were obtained and when teaching measures were obtained. The reason for this discrepancy is that in Phase I, Part 1, Ss 1, 2 and 3 were only taught responses they did not perform correctly when baseline measures were taken.

As can be discerned from Table 1, Ss 1, 2 and 3 required 3, 4 and 4 teaching trials respectively to reach criterion performance on

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[7] Number of errors

[8] Total number of possible responses

Part 1. These results indicate that even though 2 of the 3 Ss made a considerable number of errors when baseline measures were obtained, acquisition of object picture labels and action picture discriptions was relatively rapid.

Table 2

Phase I, Part 2

Set 1 (m, b, w, f)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 3 | 4 | 1 | 1 | 4 | 1 | 1 | 4 |
| 2 | 2 | 4 | 2 | 1 | 4 | 2 | 1 | 4 |
| 3 | 2 | 4 | 3 | 2 | 4 | 3 | 0 | 4 |
| 4 | 0 | 4 | 4 | 0 | 4 | 4 | 1 | 4 |
| 5 | 0 | 4 | 5 | 0 | 4 | 5 | 1 | 4 |
| | | | 6 | 1 | 4 | 6 | 1 | 4 |
| | | | 7 | 1 | 4 | 7 | 0 | 4 |
| | | | 8 | 1 | 4 | 8 | 1 | 4 |
| | | | 9 | 3 | 4 | 9 | 0 | 4 |
| | | | 10 | 0 | 4 | 10 | 0 | 4 |
| | | | 11 | 0 | 4 | | | |
| | | | 12 | 1 | 4 | | | |
| | | | 13 | 0 | 4 | | | |
| | | | 14 | 1 | 4 | | | |
| | | | 15 | 0 | 4 | | | |
| | | | 16 | 0 | 4 | | | |

Set 2 (r, p, n, g)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 1 | 4 | 1 | 1 | 4 | 1 | 0 | 4 |
| 2 | 2 | 4 | 2 | 1 | 4 | 2 | 2 | 4 |
| 3 | 2 | 4 | 3 | 0 | 4 | 3 | 0 | 4 |
| 4 | 0 | 4 | 4 | 0 | 4 | 4 | 0 | 4 |
| 5 | 1 | 4 | | | | | | |
| 6 | 0 | 4 | | | | | | |
| 7 | 1 | 4 | | | | | | |
| 8 | 0 | 4 | | | | | | |
| 9 | 0 | 4 | | | | | | |

As can be discerned from Table 2 above, Ss 1, 2 and 3 required 3, 14 and 10 teaching trials respectively to reach criterion performance on Part 2, Set 1 and 7, 2 and 2 teaching trials respectively to reach criterion performance on Part 2, Set 2. $S_2$ and $S_3$ required a considerable number of trials for criterion performance when sounding letters in Set 1 but reached criterion immediately when sounding letters in Set 2. This immediacy of criterion performance may be due to prior practice when sounding letters in Set 1 or a greater ease in articulating the required sounds in Set 2.

Table 3a

Phase I, Part 3a

Set 1 (monkey, bell, fork, watermelon)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 4 | 4 | 1 | 0 | 4 | 1 | 4 | 4 |
| 2 | 4 | 4 | 2 | 0 | 4 | 2 | 4 | 4 |
| 3 | 0 | 4 | | | | 3 | 0 | 4 |
| 4 | 0 | 4 | | | | 4 | 0 | 4 |
| Set 2 (rain, pencil, nail, girl) | | | | | | | | |
| 1 | 4 | 4 | 1 | 0 | 4 | 1 | 4 | 4 |
| 2 | 4 | 4 | 2 | 0 | 4 | 2 | 4 | 4 |
| 3 | 0 | 4 | | | | 3 | 0 | 4 |
| 4 | 0 | 4 | | | | 4 | 0 | 4 |

As can be discerned from Table 3a above, $S_2$ responded correctly to all directives issued when baseline measures were obtained and thus subsequent instruction was not appropriate. Ss 1 and 3 required 2 and 2 teaching trials respectively to reach criterion performance on Part 3a, Set 1 and Part 3a, Set 2. The incorrect responses emitted by Ss 1 and 3, when baseline measures were obtained, were possibly due to initial confusion regarding T's directives. Once teaching trials were implemented, acquisition of those responses was rapid.

Table 3b

Phase I, Part 3b

Set 1 (monkey, bell, fork, watermelon)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 4 | 4 | 1 | 0 | 4 | 1 | 4 | 4 |
| 2 | 4 | 4 | 2 | 0 | 4 | 2 | 4 | 4 |
| 3 | 0 | 4 | | | | 3 | 0 | 4 |
| 4 | 0 | 4 | | | | 4 | 0 | 4 |

Set 2 (rain, pencil, nail, girl)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 4 | 4 | 1 | 0 | 4 | 1 | 4 | 4 |
| 2 | 4 | 4 | 2 | 0 | 4 | 2 | 4 | 4 |
| 3 | 0 | 4 | | | | 3 | 0 | 4 |
| 4 | 0 | 4 | | | | 4 | 0 | 4 |

The results contained in Table 3b are identical to those contained in Table 3a. The reader is referred to Table 3a for a description of those results.

## Table 4

### Phase I, Part 4

Set 1 (monkey, bell, watermelon, fork, rain, pencil, nail, girl)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 5 | 8 | 1 | 3 | 8 | 1 | 1 | 8 |
| 2 | 5 | 8 | 2 | 5 | 8 | 2 | 5 | 8 |
| 3 | 0 | 8 | 3 | 0 | 8 | 3 | 0 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |
| Set 2 (man, bat, window, fire, run, pan, needle, grow) | | | | | | | | |
| 1 | 4 | 8 | 1 | 3 | 8 | 1 | 2 | 8 |
| 2 | 4 | 8 | 2 | 5 | 8 | 2 | 2 | 8 |
| 3 | 0 | 8 | 3 | 0 | 8 | 3 | 0 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |

As can be discerned from Table 4 above, Ss 1, 2 and 3 required 2, 2 and 2 teaching trials respectively to reach criterion performance on Part 4, Set 1 and Part 4, Set 2. It is inferred that Ss used their previously acquired skills of sounding letters and touching the first letter in printed words to sound accurately the first letter in printed words.

## Table 5

### Phase I, Part 5

Set 1 (man, bat, window, fire, run, pan, needle, game)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 8 | 1 | 7 | 8 | 1 | 3 | 8 |
| 2 | 6 | 8 | 2 | 8 | 8 | 2 | 5 | 8 |
| 3 | 6 | 8 | 3 | 2 | 8 | 3 | 1 | 8 |
| 4 | 2 | 8 | 4 | 1 | 8 | 4 | 0 | 8 |
| 5 | 5 | 8 | 5 | 3 | 8 | 5 | 1 | 8 |
| 6 | 3 | 8 | 6 | 2 | 8 | 6 | 1 | 8 |
| 7 | 0 | 8 | 7 | 0 | 8 | 7 | 0 | 8 |
| 8 | 0 | 8 | 8 | 0 | 8 | 8 | 1 | 8 |
| | | | | | | 9 | 0 | 8 |
| | | | | | | 10 | 0 | 8 |
| Set 2 (mow, bounce, witch, finger, ring, pour, next, goat) | | | | | | | | |
| 1 | 7 | 8 | 1 | 7 | 8 | 1 | 6 | 8 |
| 2 | 8 | 8 | 2 | 8 | 8 | 2 | 7 | 8 |
| 3 | 3 | 8 | 3 | 1 | 8 | 3 | 0 | 8 |
| 4 | 2 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |
| 5 | 0 | 8 | 5 | 0 | 8 | | | |
| 6 | 0 | 8 | | | | | | |

As can be discerned from Table 5 above, Ss 1, 2 and 3 required 6, 6 and 8 teaching trials respectively to reach criterion performance on Part 5, Set 1, and 4, 3 and 2 teaching trials respectively to reach criterion performance on Part 5, Set 2. All 3 Ss made fewer initial incorrect responses and reached criterion performance in fewer trials on the pictures included in Set 2, indicating possible skill generalization across object and action pictures as well as the positive effects of practice.

Table 6

Phase I, Part 6

Set 1 (monkey, rain, brush, girl, water, fork, pop, nurse)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 8 | 8 | 1 | 6 | 8 | 1 | 4 | 8 |
| 2 | 8 | 8 | 2 | 6 | 8 | 2 | 6 | 8 |
| 3 | 3 | 8 | 3 | 1 | 8 | 3 | 1 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 1 | 8 |
| 5 | 1 | 8 | 5 | 0 | 8 | 5 | 0 | 8 |
| 6 | 1 | 8 | | | | 6 | 0 | 8 |
| 7 | 0 | 8 | | | | | | |
| 8 | 0 | 8 | | | | | | |

Set 2 (mitten, read, bell, garden, wash, fall, pencil, nail)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 7 | 8 | 1 | 6 | 8 | 1 | 5 | 8 |
| 2 | 7 | 8 | 2 | 6 | 8 | 2 | 6 | 8 |
| 3 | 0 | 8 | 3 | 1 | 8 | 3 | 1 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |
| | | | 5 | 1 | 8 | 5 | 0 | 8 |
| | | | 6 | 0 | 8 | | | |
| | | | 7 | 0 | 8 | | | |

As can be discerned from Table 6 above, Ss 1, 2 and 3 required 6, 3 and 4 teaching trials respectively to reach criterion performance on Part 6, Set 1, and 2, 5 and 3 teaching trials respectively to reacn criterion performance on Part 6, Set 2. $S_1$'s performance results on both Table 5, Set 1 and Table 6, Set 1 indicate a greater number of initial incorrect responses than either $S_2$ or $S_3$ when teaching trials were implemented. This may be due to the fact that $S_1$'s articulation deficits were greater than those of either $S_2$ or $S_3$. Yet $S_1$'s performance results across respective sets on Table 5 and 6 indicate increasingly fewer errors. The assumption can be made that skill generalization was occurring across object and pictures as well as teacher cues.

## Table 7

### Phase I, Part 7

Set 1 (mop, bear, watermelon, fish, rug, pumpkin, numbers, gate)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 7 | 8 | 1 | 7 | 8 | 1 | 2 | 8 |
| 2 | 7 | 8 | 2 | 7 | 8 | 2 | 4 | 8 |
| 3 | 3 | 8 | 3 | 0 | 8 | 3 | 1 | 8 |
| 4 | 2 | 8 | 4 | 2 | 8 | 4 | 1 | 8 |
| 5 | 1 | 8 | 5 | 1 | 8 | 5 | 0 | 8 |
| 6 | 0 | 8 | 6 | 0 | 8 | 6 | 0 | 8 |
| 7 | 0 | 8 | 7 | 0 | 8 | | | |

Set 2 (walk, mix, boat, fight, ruler, purse, nuts, grow)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 7 | 8 | 1 | 8 | 8 | 1 | 5 | 8 |
| 2 | 7 | 8 | 2 | 8 | 8 | 2 | 6 | 8 |
| 3 | 2 | 8 | 3 | 1 | 8 | 3 | 2 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |
| 5 | 0 | 8 | 5 | 0 | 8 | 5 | 1 | 8 |
| | | | | | | 6 | 0 | 8 |
| | | | | | | 7 | 0 | 8 |

As can be discerned from Table 7 above, Ss 1, 2 and 3 required 5, 5 and 4 teaching trials respectively to reach criterion performance on Part 7, Set 1, and 3, 3 and 5 teaching trials respectively to reach criterion performance on Part 7, Set 2. No improvement can be ascertained for Ss 1, 2 or 3. Although when teaching trials were implemented, Tables 5, 6 and 7 consistantly indicated only 1 or 2 errors for $S_2$ or $S_3$, a closer look at their data did not indicate difficulty with any particular sound.

## Table 8

### Phase I, Part 8

Set 1 (monkey, rain, brush, girl, water, fork, pop, nurse)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 3 | 8 | 1 | 7 | 8 | 1 | 4 | 8 |
| 2 | 5 | 8 | 2 | 8 | 8 | 2 | 4 | 8 |
| 3 | 0 | 8 | 3 | 0 | 8 | 3 | 0 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |

Set 2 (mitten, read, bell, garden, wash, fall, pencil, nail)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 4 | 8 | 1 | 8 | 8 | 1 | 4 | 8 |
| 2 | 5 | 8 | 2 | 8 | 8 | 2 | 5 | 8 |
| 3 | 1 | 8 | 3 | 0 | 8 | 3 | 0 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |
| 5 | 0 | 8 | | | | | | |

As can be discerned from Table 8 above, Ss 1, 2 and 3 required 2, 2 and 2 teaching trials respectively to reach criterion performance on Part 8, Set 1 and 3, 2 and 2 teaching trials respectively to reach criterion on Part 8, Set 2. This marked improvement in response accuracy for each S, when teaching trials were implemented, may be explained in terms of the receptive vs. expressive nature of the given response. Touching the picture representing the object or action with the initial consonant sound made by T did not require sound articulation. Thus, articulation deficits could not interfere with correct responding.

Table 9

Phase I, Part 9

Set 1 (mop, bear, watermelon, fish, rug, pumpkin, number, gate)

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp | Trial | #Err. | #Resp. |
| 1 | 8 | 8 | 1 | 8 | 8 | 1 | 8 | 8 |
| 2 | 8 | 8 | 2 | 8 | 8 | 2 | 8 | 8 |
| 3 | 0 | 8 | 3 | 0 | 8 | 3 | 0 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |

Set 2 (walk, monkey, boat, fight, ruler, purse, nuts, grow)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 8 | 1 | 8 | 8 | 1 | 8 | 8 |
| 2 | 8 | 8 | 2 | 8 | 8 | 2 | 8 | 8 |
| 3 | 0 | 8 | 3 | 0 | 8 | 3 | 0 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |

As can be discerned from Table 9 above, Ss 1, 2 and 3 required 2, 2 and 2 teaching trials respectively to reach criterion performance on Part 9, Set 1 and Part 9, Set 2. This immediate response accuracy during teaching trials suggests that Ss combined skills acquired in previous parts of the program to perform this terminal skill for Phase I.

## Table 10

### Phase II, Part 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 47 | 1 | 14 | 47 | 1 | 2 | 47 |
| 2 | 6 | 47 | 2 | 14 | 47 | 2 | 2 | 47 |

Teaching trials were not implemented for Phase II, Part 1. The skills to be taught in Phase II, Part 1 were considered necessary for successful completion of Phase II, Parts 4a through 4d. Yet Ss 1, 2 and 3 correctly responded to all teacher directives when baseline measures were taken of Phase II, Parts 4a through 4d. There are two explanations for this discrepancy. Parts 4a through 4d required Ss to touch pictures that represented objects or actions which logically completed sentences. Part 1 required Ss to label or describe those objects or action pictures. Picture labeling or describing as opposed to picture discrimination may have been more difficult. An alternative explanation is that Ss correctly touched the pictures they were not familiar with in Parts 4a through 4d through the process of elimination.

## Table 11

### Phase II, Part 2

Set 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 4 | 8 | 1 | 5 | 8 | 1 | 2 | 8 |
| 2 | 2 | 8 | 2 | 2 | 8 | 2 | 0 | 8 |
| 3 | 0 | 8 | 3 | 0 | 8 | 3 | 0 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |
| | | | | Set 2 | | | | |
| 1 | 4 | 8 | 1 | 5 | 8 | 1 | 4 | 8 |
| 2 | 3 | 8 | 2 | 2 | 8 | 2 | 0 | 8 |
| 3 | 1 | 8 | 3 | 0 | 8 | 3 | 0 | 8 |
| 4 | 0 | 8 | 4 | 0 | 8 | 4 | 0 | 8 |

As can be discerned from Table 11 above, Ss 1, 2 and 3 required 2, 2 and 2 teaching trials respectively to reach criterion performance on Part 2, Set 1 and Part 2, Set 2. The results indicate a marked improvement in response accuracy when teaching trials were implemented. Increased attending to the pertinent details of the action depicted in each picture as a result of the questions asked by T prior to teaching may account for this improvement.

Table 12

Phase II, Part 3

Set 1

| S1 |  |  | S2 |  |  | S3 |  |  |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 1 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |
| 3 | 0 | 6 |  |  |  |  |  |  |

Set 2

| S1 |  |  | S2 |  |  | S3 |  |  |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 1 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |
| 3 | 0 | 6 |  |  |  |  |  |  |

As can be discerned from Table 12 above, Ss 2 and 3 responded correctly to all questions asked when baseline measures were obtained and thus subsequent instruction was not appropriate. Because $S_1$ emitted only 1 incorrect response during Trial 1 of both Set 1 and Set 2 and no incorrect responses during Trial 2 of both Set 1 and Set 2, 1 additional baseline trial was implemented. Since $S_1$ made no incorrect responses during this additional trial, subsequent instruction was not appropriate.

Table 13a

Phase II, Part 4a

Set 1

| S1 |  |  | S2 |  |  | S3 |  |  |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 0 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |

Set 2

| S1 |  |  | S2 |  |  | S3 |  |  |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 0 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |

As can be discerned from Table 13a above, Ss 1, 2 and 3 responded correctly to all directives issued when baseline measures were obtained and thus subsequent instruction was not appropriate.

Table 13b

Phase II, Part 4b

Set 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 0 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |

Set 2

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 0 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |

The results displayed in Table 13b are identical to those displayed on Table 13a. The reader is referred to Table 13a for a description of those results.

Table 13c

Phase II, Part 4c

Set 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 0 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |

Set 2

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 0 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |

The results displayed on Table 13c are identical to those displayed on Table 13a. The reader is referred to Table 13a for a description of those results.

## Table 13d

### Phase II, Part 4d

Set 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 0 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |

Set 2

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 0 | 6 | 1 | 0 | 6 | 1 | 0 | 6 |
| 2 | 0 | 6 | 2 | 0 | 6 | 2 | 0 | 6 |

The results displayed on Table 13d are identical to those displayed on Table 13a. The reader is referred to Table 13a for a description of those results.

## Table 14

### Phase II, Part 5

Set 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 6 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | 6 | 6 | 2 | 6 | 6 |
| 3 | 1 | 6 | 3 | 0 | 6 | 3 | 2 | 6 |
| 4 | 0 | 6 | 4 | 0 | 6 | 4 | 0 | 6 |
| 5 | 0 | 6 | | | | 5 | 0 | 6 |

Set 2

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 5 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | 6 | 6 | 2 | 6 | 6 |
| 3 | 0 | 6 | 3 | 0 | 6 | 3 | 1 | 6 |
| 4 | 0 | 6 | 4 | 0 | 6 | 4 | 0 | 6 |
| | | | | | | 5 | 0 | 6 |

As can be discerned from on Table 14 above, Ss 1, 2 and 3 required 3, 2 and 3 teaching trials respectively to reach criterion performance on Part 5, Set 1, and 2, 2 and 3 teaching trials respectively to reach criterion performance on Part 5, Set 2. The incorrect responses emitted by Ss 1, 2 and 3 when baseline measures were obtained were possibly due to initial confusion by T's directive. Once teaching trials were implemented, acquisition of those responses was rapid.

Table 15

Phase II, Part 6

Set 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 6 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | 6 | 6 | 2 | 6 | 6 |
| 3 | 4 | 6 | 3 | 0 | 6 | 3 | 4 | 6 |
| 4 | 0 | 6 | 4 | 0 | 6 | 4 | 0 | 6 |
| 5 | 0 | 6 | | | | 5 | 0 | 6 |

Set 2

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 6 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | 6 | 6 | 2 | 6 | 6 |
| 3 | 4 | 6 | 3 | 2 | 6 | 3 | 1 | 6 |
| 4 | 3 | 6 | 4 | 1 | 6 | 4 | 1 | 6 |
| 5 | 0 | 6 | 5 | 0 | 6 | 5 | 0 | 6 |
| 6 | 0 | 6 | 6 | 0 | 6 | 6 | 0 | 6 |

Set 3

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 6 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | 6 | 6 | 2 | 6 | 6 |
| 3 | 1 | 6 | 3 | 1 | 6 | 3 | 0 | 6 |
| 4 | 1 | 6 | 4 | 1 | 6 | 4 | 1 | 6 |
| 5 | 0 | 6 | 5 | 0 | 6 | 5 | 0 | 6 |
| 6 | 0 | 6 | 6 | 0 | 6 | 6 | 0 | 6 |

Set 4

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 6 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | 6 | 6 | 2 | 6 | 6 |
| 3 | 1 | 6 | 3 | 0 | 6 | 3 | 0 | 6 |
| 4 | 0 | 6 | 4 | 1 | 6 | 4 | 0 | 6 |
| 5 | 0 | 6 | 5 | 0 | 6 | | | |
| | | | 6 | 0 | 6 | | | |

As can be discerned from Table 15 above, Ss 1, 2 and 3 required 3, 2 and 3 teaching trials respectively to reach criterion performance on Part 6, Set 1; 4, 4 and 4 teaching trials respectively to reach criterion performance on Part 6, Set 2; 4, 4 and 4 teaching trials respectively to reach criterion performance on Part 6, Set 3; and 3, 4 and 2 teaching trials respectively to reach criterion performance on Part 6, Set 4. A closer look at these results suggests that for the most part each S had increasingly fewer initial incorrect responses across sets when teaching trials were implemented. It is assumed that skill generalization was occurring.

Tables 16 and 17 contain the results of Phase III, Parts 1 and 2 respectively. In both of these tables, Trials 1 and 2 represent baseline measures obtained prior to teaching Phases I, II or III, and Trials 3 and 4 represent baseline measures obtained subsequent to teaching Phase I and II but prior to teaching Phase III. All remaining trials indicate teaching measures.

Table 16

Phase III, Part 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | [illegible] | 58 | 1 | 38 | 58 | 1 | 10 | 58 |
| 2 | 28 | 58 | 1 | 40 | 58 | 2 | 10 | 58 |
| 3 | 24 | 58 | 3 | 32 | 58 | 3 | 6 | 58 |
| 4 | 24 | 58 | 4 | 32 | 58 | 4 | 6 | 58 |
| 5 | 10 | 24 | 5 | 13 | 32 | 5 | 2 | 6 |
| 6 | 6 | 24 | 6 | 8 | 32 | 6 | 0 | 6 |
| 7 | 2 | 24 | 7 | 1 | 32 | 7 | 0 | 6 |
| 8 | 0 | 24 | 8 | 0 | 32 | | | |
| 9 | 0 | 24 | 9 | 0 | 32 | | | |

It should be noted when reading Table 16 that there is a difference between number of possible responses when baseline measures were obtained and when teaching measures were obtained. The reason for this discrepancy is that in Phase III, Part 1, Ss 1, 2 and 3 were only taught responses they did not perform correctly when the most recent baseline measures were taken.

As can be discerned from Table 16 above, Ss 1, 2 and 3 required 5, 5 and 3 teaching trials respectively to reach criterion performance on Part 1. These results indicate that even though 2 of the 3 Ss made a considerable number of errors when baseline measures were obtained, acquisition of object picture labels and action picture descriptions on worksheets developed rapidly.

When comparing the results of baseline measures obtained prior to teaching Phases I, II and III (e.g., Trials 1 and 2) to baseline measures obtained subsequent to teaching Phases I and II but prior to teaching Phase III (e.g., Trials 3 and 4), a small increase in correct responding can be ascertained. The assumption can be made that previous acquisition of object picture labels and action picture descriptions increased the number of correct responses in Phase III, Part 1. Yet, the difference between the 2 sets of baseline measures was not great. This may have been due to their difficulty identifying small pictures traced or drawn on worksheets, even though they may have previously learned to label or describe those same commercially produced pictures.

Table 17

Phase III, Part 2

Set 1

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 6 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | 6 | 6 | 2 | 6 | 6 |
| 3 | 3 | 6 | 3 | 2 | 6 | 3 | 3 | 6 |
| 4 | 3 | 6 | 4 | 3 | 6 | 4 | 3 | 6 |
| 5 | 3 | 6 | 5 | 2 | 6 | 5 | 3 | 6 |
| 6 | 0 | 6 | 6 | 0 | 6 | 6 | 0 | 6 |
| 7 | 0 | 6 | 7 | 0 | 6 | 7 | 0 | 6 |

Set 2

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 6 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | | | 2 | 6 | 6 |
| 3 | 3 | 6 | 3 | 2 | 6 | 3 | 3 | 6 |
| 4 | 2 | 6 | 4 | 2 | 6 | 4 | 2 | 6 |
| 5 | 3 | 6 | 5 | 1 | 6 | 5 | 2 | 6 |
| 6 | 1 | 6 | 6 | 0 | 6 | 6 | 0 | 6 |
| 7 | 0 | 6 | 7 | 0 | 6 | 7 | 0 | 6 |
| 8 | 0 | 6 | | | | | | |

Set 3

| | S1 | | | S2 | | | S3 | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 6 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | 6 | 6 | 2 | 6 | 6 |
| 3 | 2 | 6 | 3 | 3 | 6 | 3 | 3 | 6 |
| 4 | 3 | 6 | 4 | 2 | 6 | 4 | 3 | 6 |
| 5 | 0 | 6 | 5 | 0 | 6 | 5 | 0 | 6 |
| 6 | 0 | 6 | 6 | 0 | 6 | 6 | 0 | 6 |

Set 4

| S1 | | | S2 | | | S3 | | |
|---|---|---|---|---|---|---|---|---|
| Trial | #Err. | #Resp. | Trial | #Err. | #Resp. | Trial | #Err. | #Resp. |
| 1 | 6 | 6 | 1 | 6 | 6 | 1 | 6 | 6 |
| 2 | 6 | 6 | 2 | 6 | 6 | 2 | 6 | 6 |
| 3 | 3 | 6 | 3 | 3 | 6 | 3 | 2 | 6 |
| 4 | 3 | 6 | 4 | 3 | 6 | 4 | 2 | 6 |
| 5 | 1 | 6 | 5 | 1 | 6 | 5 | 0 | 6 |
| 6 | 1 | 6 | 6 | 0 | 6 | 6 | 0 | 6 |
| 7 | 0 | 6 | 7 | 0 | 6 | | | |
| 8 | 0 | 6 | | | | | | |

As can be discerned from Table 17 above, Ss 1, 2 and 3 required 3, 3 and 3 teaching trials respectively to reach criterion performance on Part 2, Set 1; 4, 3 and 3 teaching trials respectively to reach criterion performance on Part 2, Set 2; 2, 2 and 2 teaching trials respectively to reach criterion performance on Part 2, Set 3; and 4, 3 and 2 teaching trials respectively to reach criterion performance on Part 2, Set 4. Closer inspection of these results suggests that for the most part each S had increasingly fewer initial incorrect responses across worksheet sets when teaching trials were implemented. It is assumed that skill generalization was occurring.

When comparing the results of baseline measures obtained prior to teaching Phases I, II and III (e.g., Trials 1 and 2) to baseline measures obtained subsequent to teaching Phases I and II but prior to teaching Phase III (e.g., Trials 3 and 4), a substantial increase in correct responding can be ascertained. The assumption is made here that to some degree, Ss used the skills learned in Phases I and II when attempting to perform the skills required in Phase III.

## Discussion

The results presented strongly suggest that the program objectives were successfully accomplished. That is: a) the students learned to label selected object pictures and describe selected action pictures, to sound eight initial consonants in printed words, to make the initial consonant sound of objects and actions represented in pictures, and to label unknown words given pictures representing objects or actions with differing initial consonant sounds; b) the students learned to choose words (e.g., subjects, verbs, or objects) which logically completed sentences; and c) the students learned to use initial consonant sounds, picture cues and context cues in combination to label unknown words in sentences.

Based on these results, the following assumptions seem tenable: a) trainable level students can learn relatively complex reading skills; b) teachers need not have to choose between the "whole word" approach and an approach based strictly on letter-sound relationships but can pursue an approach espousing the teaching of combinations of skills; c) teachers can initially introduce reading words to trainable level students through the "whole word" approach and then can begin to teach word analysis skills. These skills, when developed to their fullest, may eliminate the necessity for teacher dependent word drill which is common when acquiring words through the "whole word" approach exclusively; and d) students with severe articulation problems can utilize initial consonant sounds of words as a word analysis skill.

Although the skills taught are limited to scope, hopefully the objectives, procedures, materials and design can be used as a model when considering additional word analysis skills or extensions of those already taught. In utilizing letter-sound relationships teachers may introduce final consonants as well as additional initial consonants. In the area of context cues, the teacher may consider the choice of prepositions which logically complete sentences. More complex picture cues might be considered to increase difficulty level and skill functionality when combining picture context cues, printed context cues and initial consonant sounds to determine the labels of unknown words. For example, a picture displaying a variety of objects and actions such as in a picnic scene might be displayed instead of single objects or action pictures.

For those students who do not have the necessary prerequisite skills for completion of this program, the teacher may wish to use its objectives, procedures, materials and design as a starting point for considering a finer breakdown of required responses. For example, the students of concern here understood logical and absurd relationships to the degree that if they did not correctly respond to related questions or directives when baseline measures were obtained, they quickly acquired those responses. For students who do not have some understanding of logical and absurd relationships, the teacher would have to further break down the objectives of Phase II into more basic components (e.g., to understand an absurd action a student may have to directly experience it, such as attempt to eat a piece of clothing).

In considering the implications of this study, the limited nature of the instructional design should be realized. For example, baseline measures of student responses to the questions and directives of Phase III, Part 2, were taken twice: Preceeding any teaching of Phases I, II or III and then following the teaching of Phases I and II but prior to teaching Phase III. These measures indicate an increase in correct responding during the second set of baseline measurements. From this increase, it is assumed that the skills taught in Phase I and II were responsible for that increase but the present design does not pinpoint precisely what skills affect the learning of other skills and does not rule out the possible facilitating effects of other variables. In order to obtain such specific information the present design should be replaced by one more sensitive such as a multiple baseline design wherein baseline measures of all skills to be taught are obtained continuously. As successive baseline measures are compared, significant changes can be more confidently attributed to the teaching of specific skills. On the other hand the priorities of the classroom dictate an approach requiring greater instructional time and less time devoted to measurement. For these reasons the less sensitive but more practical criterion referenced measurement design was chosen.

Due to these and other limitations the absolute effectiveness of this program is impossible to determine. Replication of this program with similar populations of children will produce some reliability data as well as pinpoint areas to eliminate, modify or extend. Yet we can confidently say that the negative instructional prognosis for trainable level students is clearly questionable. If trainable level students can learn higher level reading skills, it hopefully follows that the future of the trainable retarded individual contains greater personal independence and economic productivity in our complex society.

## Appendix A

### Phase I, II and III

### Example Data Sheets

The following data sheet format was used throughout each phase. Below are example adaptations of this data sheet for particular parts of Phase I, II or III.

### Task: Phase I, Part 5, (Set 1), Teaching

| Name | man | bat | window | fire | run | pan | needle | game | Date |
|---|---|---|---|---|---|---|---|---|---|
| $S_1$ | - | + | - | - | - | - | + | - | 1/10 |
| $S_2$ | + | + | + | + | - | + | + | - | 1/10 |
| $S_3$ | + | + | + | + | - | + | + | + | 1/10 |
| $S_1$ | + | + | + | + | - | + | + | - | 1/11 |
| $S_2$ | + | + | + | + | + | + | + | - | 1/11 |
| $S_3$ | + | + | + | + | + | + | + | + | 1/11 |

### Task: Phase II, Part 2, (Set 1), Teaching

| Name | scissors paper | scissors table | sock foot | sock hand | comb hair | tooth-brush hair | pencil hand | pencil toes | Date |
|---|---|---|---|---|---|---|---|---|---|
| $S_1$ | + | - | - | + | - | + | - | - | 10/30 |
| $S_2$ | + | - | + | - | - | + | - | - | 10/30 |
| $S_3$ | - | + | + | - | + | + | + | + | 10/30 |
| $S_1$ | + | + | - | - | + | + | + | + | 11/4 |
| $S_2$ | + | + | - | - | + | + | + | + | 11/4 |
| $S_3$ | + | + | + | + | + | + | + | + | 11/4 |

Task: Phase III, Part 2, (Set 1), Teaching

| Name | I drink with the glass. | The mailman will come to my house. | I will will bounce the ball. | I will ride in the wagon. | See the policeman ride in the car. | The girl will run to the house. |  |  | Date |
|---|---|---|---|---|---|---|---|---|---|
| S1 | + | – | – | – | + | + |  |  | 3/10 |
| S2 | + | + | + | + | – | – |  |  | 3/10 |
| S3 | – | – | + | + | + | + |  |  | 3/10 |
| S1 | + | + | + | + | + | + |  |  | 3/13 |
| S2 | + | + | + | + | + | + |  |  | 3/13 |
| S3 | + | + | + | + | + | + |  |  | 3/13 |

Task: Phase II, Part 4c, (Set 2), Baseline

| Name | The _____ will pop. | The _____ opens the door. | The _____ is on a string. | The _____ flys high in the sky. | The _____ is ringing. | The _____ eats lots of food. |  |  | Date |
|---|---|---|---|---|---|---|---|---|---|
| S1 | + | + | + | + | + | + |  |  | 10/4 |
| S2 | + | + | + | + | + | + |  | V | 10/4 |
| S3 | + | + | + | + | + | + |  |  | 10/4 |
| S1 | + | + | + | + | + | + |  |  | 10/7 |
| S2 | + | + | + | + | + | + |  |  | 10/7 |
| S3 | + | + | + | + | + | + |  |  | 10/7 |

## Appendix B

### Phase II, Part 6

### Example Worksheet

1. We play on the ________________ . (drink, swing, marshmallow)

2. Janet will ________________ the ice-cream cone. (eat, work, train)

3. ________________ is a girl. (come, train, Janet)

4. We will ride on the ________________ . (ball, train, look)

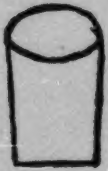
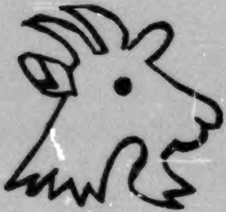
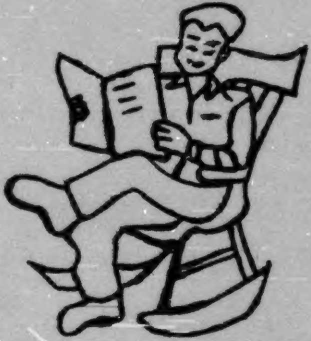
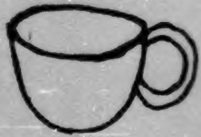
5. Janet and Mark ________________ something good. (want, look, swing)

6. The ________________ will go on the swing. (farm, come, girl)

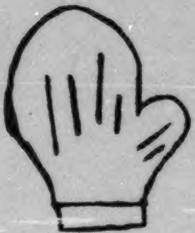
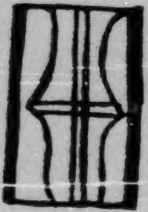
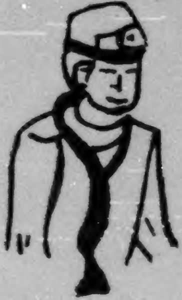
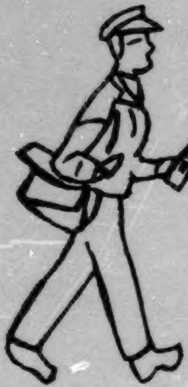
## Appendix C

Phase III, Part 2

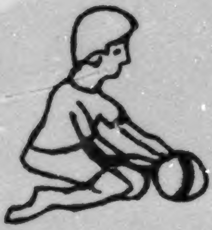
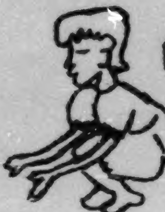
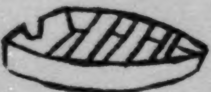
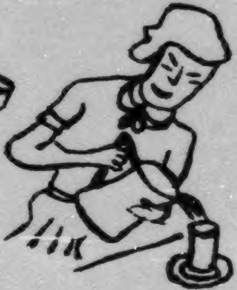
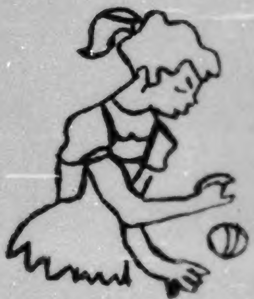
Example Worksheet

1. I drink with the glass.

2. The mailman will come to my house.

3. I will bounce the ball.

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# TEACHING SOCIAL INTERACTION SKILLS TO SEVERELY HANDICAPPED STUDENTS

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## I. OVERVIEW

In order to familiarize the reader with the organization of this paper, a brief description of each section is presented below.

Section II, Rationale - Review of the Literature, provides the rationale for a paper on teaching social interaction skills to severely handicapped students. The two main objectives of this paper are to: 1) provide a system for predicting, explaining and systemetizing social interactions; 2) provide an illustration of a specific instructional program for teaching social interactions as an example of how to apply information from objective 1.

In an attempt to accomplish these objectives, each section of the paper begins with a discussion of general considerations and information related to social interaction skills. Each discussion is followed by a description of specific procedures for assessing and teaching social interaction skills. The specific procedures to be described were designed and implemented by the authors in two classes for severely handicapped students.

Section III discusses defining and measuring social interaction skills and then illustrates a specific measurement procedure used by the authors to assess social interaction skills. In an attempt to define the important parameters of social interactions, the first part of Section III provides developmental and normative analyses of social interaction skills. Based on the developmental and normative analyses, important parameters of social interactions are operationally defined and incorporated into the specific assessment procedure used in the authors' sample program. The assessment procedure devised consists of five steps: 1) assessment of students cognitive, motor and language functioning levels; 2) selection of materials for assessment purposes; 3) operationally defining social interaction skills; 4) assessing social interaction skills; and 5) additional assessment. Results of the authors' baseline measures are presented and discussed.

Section IV focuses on how to teach isolative and cooperative social interaction skills. A discussion of general considerations in designing an instructional program provides information relevant to determining which social skills to directly teach, environmental facilitators and impedors of social interactions and the importance of providing activities which will insure that skills are performed across a variety of appropriate environmental settings.

Following the general considerations discussion specific instructional procedures the authors use in teaching social interaction skills are delineated. Basically in the authors' program games and activities are taught on two interaction levels, isolative and cooperative. Instruction procedures for each level are described in detail and include: 1) summary of component skills taught; 2) a list of sample activities the component skills can be taught through; 3) a sample task analysis of a specific skill; 4) a sample teaching procedure for a specific skill.

Section V is devoted to a discussion of the programs' limitations and considerations for developing future programs. Within this section factors which detracted from the effectiveness of the authors' program are delineated. The authors hope that future instructional programs improve on the instructional program delineated through accounting for the limitations.

Finally, the last section (VII) contains a selected bibliography relevant to developing social interaction programs for severely handicapped students.

## II. RATIONALE - REVIEW OF LITERATURE

This paper will attempt to articulate notions related to teaching social interaction skills to severely handicapped individuals (see Sontag, Burke & York, 1974, for a definition of severely handicapped).[1] To acquaint you with considerations related to teaching severely handicapped individuals social interaction skills, relevant literature will be briefly summarized:

1. Currently, procedures are being developed to teach severely handicapped individuals skills in areas such as language, self-help, motor, and vocational (e.g., Brown, Bellamy, & Sontag, 1971; Brown & Sontag, 1972; Brown, Scheuerman, Cartwright & York, 1973; Brown, Williams & Crowner, 1974; Gold, 1972).
2. Although many severely handicapped individuals can be taught to successfully perform rudimentary language, vocational, self-help, motor, and academic skills, they seldom perform appropriately in home-living, recreational, and vocational environments due to inadequate social interaction skills (Seeley, 1971; Goldstein, 1964).
3. Social interaction skills can be taught or altered through systematic environmental manipulations (Azrin & Lindsley, 1956; Kale, Kaze & Whelan, 1968; Kirby & Toler, 1970; Lovass, Schaeffer & Simmons, 1965; Milby, 1970; O'Conner, 1969; Paloutzian, Hasazi, Striefel & Edgar, 1971; Quitlitch & Risley, 1973; Updegraff & Herbst, 1933; Wahler, 1967; Whitman, Mercurio & Chaponigri, 1970; Morris & Dolker, 1974; Koegel, Firestone & Kramme, 1974; Buell, Stoddard, Harris & Baer, 1968; Ellis, 1973).
4. Many studies have documented procedures for decreasing or eliminating inappropriate social behaviors such as rumination, tantrums, physical aggression, etc. (e.g., Fox and Azrin, 1973; Weisberg, Passman and Russel, 1973; Sajwaj, Libet and Stewart, 1974). Moreover a number of studies have documented procedures for teaching severely handicapped individuals such rudimentary social interaction skills as greeting others, passing a ball back and forth with another person, pulling another person in a wagon (e.g., Stokes, Baer and Jackson, 1974; Paloutzian, Hasazi, Streifel and Edgar, 1971; Whitman, Mercurio and Chaponigri, 1970). However, no studies have documented procedures for teaching severely handicapped individuals the "sophisticated" social interaction skills which are needed in vocational, recreational, and home living settings.

One reason for a lack of documented procedures for teaching severely handicapped individuals sophisticated social interaction skills may be the complexness of social interaction skills. This complexness results in difficulties operationally defining, teaching, and measuring skills related to social interactions. That is, a social interaction situation is composed of a complex flow of behaviors which may be arbitrarily disected and described. Unfortunately, as soon as the flow is disected and described the flavor of the real situation is lost. In fact, even movies, videotapes, and sound recordings of social situations are unable to convey all the dimensions of the situations with adequate quality.

---

[1] As used in this paper social interactions are not restricted to individual interactions with other persons but include individuals' interactions with objects and themselves.

However, as it is not the function of a soup recipe to give taste to the soup, it is not the function of a description of social interactions to reproduce the interactions in all their complexness. The function of a description of social interactions is to provide a foundation for predicting, explaining and systematizing social interactions, not to "capture" or reproduce the delighted chortle of a baby or the complexities of social interactions at a cocktail party.

Given that it is not possible to capture all the complexities of social interactions it is not impossible to systematize social interactions and make highly reliable predictions and explanations concerning them. Similarly, although a teaching paradigm cannot encompass all the complexities of social interactions it does not necessarily follow that the paradigm is incapable of teaching sophisticated social interaction skills.

Included within this paper is general information on assessing and teaching social interaction skills and a description of the social interaction program the authors have developed and implemented in two classes for severely handicapped students. The authors' program is presented as an example of a social interaction instructional program viable within a public school classroom.

The two classes the social interaction program was implemented in will be designated as Class A and Class B. In Class A the 6 students, 4 female and 2 male, ranged in CA from 13 to 16 years and in MA from 5 to 7 years. The range of IQ's was from 38 to 52. All students were enrolled in the Madison Public Schools in a self-contained classroom for severely handicapped students.

Class B was constituted during the school year. Consequently, some students were transferred in and out of the class during programming. Thus, of the 9 students, only 5 have received sustained instruction. Of these 5, 3 were male and 2 were female. Their CA's ranged from 13 to 18 years and IQ's ranged from 39 to 42. As in Class A, all students were enrolled in the Madison Public Schools in a self-contained classroom for severely handicapped students.

To provide you with a brief overview of the authors' program the instructional phases will be briefly described. The three basic instructional phases of the program were:

Phase I - Teaching students to socially interact and play games with the teacher.

Phase II - Teaching students to socially interact and play a game with another student.

Phase III - Teaching students to socially interact and play games with two or more other students.[2]

---

[2] In Class A instruction occurred during "free time" each day. Free time lasted for 15 minutes, from 11:15 to 11:30 on Monday, and from 11:45 to 12:00 for the remainder of the week. Students received as many instructional trials as time permitted. In Class B instruction also occurred

These phases will be discussed at greater length in Section IV. Table 1 summarizes the instructional sequence used to teach isolative and cooperative social interaction skills.

Identification and definition of basic interaction skills is necessary to the development of specific measurement and instructional procedures. The following section deals with defining and measuring skills involved in social interactions. First a discussion of developmental and normative analysis of social interaction patterns will be provided. From this analysis, specific assessment procedures were developed for the authors' social interaction instructional programs. Specific measurement procedures and results the authors use of this measurement are presented.

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[2] during free time. Free time lasted for 20 minutes from 11:10 to 11:30 Monday and from 11:40 to 12:00 for the remainder of the week. In each classroom, Phase I was administered to the student on a one-to-one basis. During Phase II two students were paired by the teacher and taught cooperative play. During Phase III two or more students were instructed by the teacher at an empty table.

## Table 1

## Summary of Basic Instructional Sequence

### Summary of Basic Instructional Sequence - Isolative Instructional Skills

The basic instructional sequence of the program was:

1. Parental questionnaire
2. Free play baseline (Pretest)
3. Teaching Phase I - Teaching students skills necessary to appropriately interact (manipulate) an isolative toy
4. Teaching Phase II - Providing opportunities for students to practice the skills which taught in Phase I by structuring the environment to facilitate usage of the skills.
5. Free play baseline

### Summary of Basic Instructional Sequence - Cooperative Instructional Skills

The basic instructional sequence of the program was:

1. Parental questionnaire
2. Free play baseline
3. Structured baseline (Class A only)
4. Rebaseline
5. Teaching Phase I - Teaching students to socially interact and play a game with the teacher
6. Determining pairs by placing a student with a high level social interaction skills with a student with low level skills
7. Teaching Phase II - Teaching students to socially interact and play a game with another student
8. Teaching Phase III - Teaching students to socially interact and play a game with two or more students.
9. Free play baseline

## III. DEFINING AND ASSESSING SOCIAL INTERACTION SKILLS

### A. Developmental and Normative Analysis of Social Interaction Skills

Due to a paucity of information on teaching social interaction skills to severely handicapped students we used developmental literature and normative analysis to help us determine the important parameters of social interactions.

There is an entity of developmental literature which divides the development of social interaction skills into various stages or levels (e.g., Parten & Newball, 1943; Piaget, 1952; Ellis, 1973). Obviously, all developmentalists do not agree on how many critical levels there are, on the operational definitions of the levels or on the chronological order of the levels, etc. The levels delineated by Parten and Newhall (1943) are fairly representative of the literature (Table 2).

The Parten and Newhall levels do not include several basic parameters of social interactions. For instance, people's interaction patterns typically change from primarily autistic and isolative to primarily parallel and cooperative. In addition, interactions progress from being controlled by adults to being primarily controlled by peers (Harris, Wolf & Baer, 1964; Hartup, 1964; Stevenson, 1965; and McCoy & Zigler, 1965). Obviously, this description grossly oversimplifies interactions and their changes over time. However, it is hoped that this grief description will provide you with a context for the discussion which follows.

The fact that people's interaction patterns change over time and the usual direction of the change is useful. However, this information is not sufficient for developing social interaction programs for severely handicapped individuals. The developmental literature does not clearly specify: 1) the frequency individuals engage in various types of interactions; 2) the appropriate time and place to perform skills associated with various types of social interactions; 3) the chronological age (CA) appropriateness of tasks related to the social interactions levels; or 4) the basic component skills involved in social interactions. The following paragraphs will attempt to delineate what normative analysis indicates in relation to parameters 1, 2, 3 and 4.

1. People typically engage in skills related to autistic, unoccupied, isolative, observational, attempted interactions, parallel, associative and cooperative social interaction levels. For instance, most people engage in autistic interactions such as strumming their fingers and tapping their toes. Also, people frequently spend blocks of time apparently doing nothing (unoccupied) or engage in isolative interactions such as making puzzles, painting, and reading books. Observing others is a universal pasttime assumed in such activities as spectator sports, drama, and television. In addition, engaging in activities parallel to others, in association with others, and in cooperation with others, are also "normal" activities.

However, it may not be socially appropriate for people to engage in a skill related to one interaction level too frequently or too extensively. For example, people who spend most of their time engaged in skills related to either the autistic pattern (e.g., reading books, painting) or the unoccupied pattern (e.g., staring into space) or the observational pattern (e.g., playing bridge, playing ping-pong) may be denoted as "different" by society. Skills related to some interaction levels engaged in too frequently

## Table 2

## Levels of Social Interaction

Autistic level. Child shows little or no awareness of others or of environment; engages in self-stimulatory behavior; head banging, slapping, rocking, eye-pressing, etc.

Unoccupied level. Child shows some awareness of the environment but makes no attempt to interact with it; sits, walks aimlessly; looks around room or out of window; may observe activities of others from a distance or for short periods of time.

Independent level. Child plays with toys or objects, but in an isolated manner; makes no attempt to interact with others.

Observing level. Child approaches others and observes their activities without any attempt at involvement; may attempt to sit near others without interacting with them; observation of others must be of a sustained nature.

Attempted interaction level. Child initiates some attempt at interaction with others; attempts to engage in same activity or occupy same location; vocalizes to get attention of others; interaction can be positive or negative, e.g., hitting or pushing another, but if negative, should not merely be self-defensive.

Parallel interaction level. Child plays independently, but in a way which brings him closer to others; may utilize same toys, e.g., playing side by side in sandbox; plays beside rather than with others; devotes full awareness to the activity of the other child.

Associative interaction level. Child plays with others but activity does not require mutual participation; may play with same materials, borrowing and lending; exchanging play materials; following one another with trains or wagons; engaging in similar activities.

Cooperative interaction level. Child interacts with others in activity which necessitates mutual participation; plays ball with others; plays on swings with one child pushing, etc.

have more socially "deviant" connotations than others. For example, people who extensively engage in skills related to the autistic level may be considered by many to be more "deviant" than people who extensively engage in skills related to the cooperative interaction level.

2. The time and place people engage in skills related to an interaction level should be considered in the development of a social interaction instructional program. For instance, it may be acceptable for people to strum fingers (autistic pattern) when studying by themselves, somewhat acceptable to strum fingers during a boring meeting, but it is generally inappropriate to loudly strum during a piano concert. Similarly, it may be acceptable for people to put together a puzzle by themselves (isolated pattern) but it is generally socially inappropriate to put together a puzzle when all other people in the room are playing dominoes.

3. The age appropriateness of a task associated with interactions should be considered when delineating tasks to construct social interactions around. For example, it may be more socially appropriate to teach a six year old to play with a yo-yo (isolative pattern) then to teach a 42 year old man to play with a yo-yo. Conversely, it may be more socially appropriate to teach a 42 year old man to play solitaire then to teach a six year old.

4. Basic component skills of social interactions may be identified in relationship to interactions involving oneself and social interactions involving others. Social interactions which involve interacting with others (e.g., parallel, associative and cooperative social interaction patterns) may be portrayed as consisting of at least five basic components: a) recognition of appropriate time and place for a social interaction; b) initiating interactions; c) receiving requests for interactions; d) sustaining interactions; e) terminating interactions.

Initiating an interaction consists basically of appropriately greeting the other people, asking them to engage in an activity (such as cards, a work activity, conversation), and then determining if they accepted or declined. Receiving a request for an interaction usually consists of determining if you are able to or want to engage in an interaction at the given time or place and either appropriately accepting or declining the request. Sustaining an interaction typically involves appropriately engaging in a social interaction or related task for a period of time or until the task is completed. Finally, terminating a social interaction often consists basically of determining that either the task is complete, that there is no more time, that you no longer want to engage in the task; then, providing the appropriate salutation and if necessary, cleaning up the task area.

Observations of severely handicapped individuals in social interaction situations indicate that some appear to initiate, receive, sustain and terminate social actions with peers. Close scrutiny of such interactions often fails to reveal precisely how the interactions were initiated, received, sustained or terminated. Such observations sometimes lead spectators to posit that the severely handicapped individuals are using their own communication system to foster, receive, sustain and terminate social interactions. Even if severely handicapped individuals use their own communication system, in many situations the use of such a system is ineffective. That is, it is only effective among the limited number of individuals who know the system. The implication is that one component of a social interaction program should be to teach severely handicapped individuals to appropriately verbalize the initiation, reception, sustaining, and termination of social interactions. However, nonverbal students should be taught to appropriately nonverbally initiate, receive, sustain and terminate interactions.

The skills involved in isolative activities consist of at least four basic components: a) recognition of the appropriate time and place for a particular isolative activity; b) selecting and locating an available toy/ game/object appropriate for isolative play (e.g., students go to bookshelf and find a particular magazine they want to read); c) sustaining appropriate interaction with the selected toy/game/object (e.g., completion of a puzzle, completion of a page or chapter of a book, end of free time); d) properly terminating the activity (e.g., cleaning up the play area, putting away the materials).

It is essential to articulate how developmental or "normative" information relates to social interaction instructional programs. Developmental and normative information indicates that people engage in skills related to autistic, unoccupied, isolative, attempted, parallel, associative and cooperative social interaction levels. However, in many instances it may not be appropriate or necessary to implement instructional programs for each social interaction level. Once people have learned skills related to cooperative and isolative social interactions they should engage in skills related to observational, attempted, and parallel social interaction patterns without additional instruction. That is, the skills involved in observational, attempted and parallel patterns are required by and thus should have been learned through instruction on cooperative and isolative patterns. In addition, autistic and unoccupied interaction patterns should also occur without intensive training.[3] Thus, only instructional programs related to cooperative and isolative interaction patterns may need to be implemented. However, it should be noted that teaching skills related to isolative and cooperative social interaction patterns should significantly effect the frequency, time, and place autistic, unoccupied, parallel, and associative interaction patterns are performed. That is, the more frequently people engage in skills related to cooperative interactions the less frequently they may engage in skills associated with autistic and unoccupied interactions.

These considerations indicate that it would not be appropriate for an instructional program to teach skills related to cooperative interactions and simultaneously attempt to eliminate the performance of skills related to isolative and autistic interactions (Eckerman, Whatley and Kutz, 1974; Smith and Connally, 1972). The objective of an instructional program should be to teach people a range of CA appropriate skills related to isolative and cooperative interaction patterns. In addition, people should be encouraged to engage in the skills related to all the interaction patterns at "normal" frequencies, at appropriate times and in appropriate places.

This brief review of developmental literature and normative analysis indicates that prior to implementing a program to teach severely handicapped individuals selected social interaction skills the frequencies, times and settings in which those skills are performed by "normal" individuals of similar CA should be assessed. The program's objectives should then be determined in relationship to the "normal" performance of the specified skills (Walker and Hops, 1973). More specifically, if the objective of an instructional program is to teach social interactions skills related to a vocational setting, the social interaction skills needed in the vocational setting should first be assessed and then skills related to the significant interaction patterns should be taught. If the objective of an instructional program is to teach social interaction skills related to specified recreation or home living settings, the necessary skills related to significant social interaction patterns in those settings should be taught.

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[3] In some instances, such as when motor patterns are being trained, it may be efficacious to teach skills related to autistic interaction patterns (Brunner, 1973).

## B. Adapting the Developmental and Normative Information to the Specific Procedures of the Authors' Program

The developmental and normative information was used to delineate the salient parameters of social interactions which should be evaluated through prebaseline and baseline assessment. The authors' baseline measures were designed to indicate the number, frequency and duration of the tasks or games each student played, the appropriateness of social interactions surrounding each task and which peers interacted together. Information obtained through baseline measures was used to delineate what skills each student needed to learn. The following procedures were used by the authors to obtain this information:

1. pre-baseline assessment
2. selection of materials
3. operationally defining the skills involved in social interactions
4. baseline measurement
5. results of baseline assessment
6. additional baseline measurement

### 1. Pre-baseline Assessment

Information was derived from the individual's ongoing curriculum to determine individuals' functioning levels in areas such as language, math, reading, and cognition. Then vocational, home living and recreational tasks appropriate to the individual's functioning level were selected to teach the social interactions through. Games and tasks to teach interactions through were chosen on the basis of: 1) games and tasks available within the classroom; 2) games and tasks available within the homes of the individuals (this was accomplished through a parent conference questionnaire); and 3) games and tasks available at group homes (this was accomplished through a group home survey). When feasible, social interactions were taught through tasks from the student's ongoing curriculum (e.g., juice time). The goal of the program was to teach CA appropriate tasks; however, it was usually necessary to start with tasks at the individual's functional level and progres toward CA appropriate tasks.

### 2. Selection of Materials

The following list of materials was used for baseline measurement and instructional purposes. As indicated, assessment was made of the individual's functioning levels in prebaseline assessment. The games, play objects and tasks were chosen after the prebaseline assessment making it possible to match activities to student functioning levels. The games and play objects were then made available to students during baseline, free play and instructional periods.

a. Games or play objects

1. Dominoes
2. Cootie
3. Lotto
4. Bingo
5. Dart game
6. Puzzles
7. Ball
8. Yo-yo
9. Silly putty
10. Twister
11. Cards - card racks[4]
    a) Regular poker cards
    b) Old Maid
    c) Crazy Eights
    d) Snap
    e) Hearts
    f) Animal Rummy

b. Play area (see instructional setting and Appendix A)
c. Evaluation sheets (See Appendix E)

Additional considerations involving the selection of games and tasks will be provided in Section III under general considerations for designing an instructional program.

### 3. Operational Definitions

Using the developmental and normative information as guides we selected and operationally defined salient parameters of social interaction situations. The operational definitions generated were then used in the assessment of the students social interaction skills. That is, we observed the students social interactions and used the operation definitions to describe and code our observations. The operational definitions that are presented in Table 3 were developed by the authors to facilitate the objective measurement of social interaction skills.

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[4] The card rack is introduced as an aide, not a necessary item to the game. It can reduce student's inability to view his/her own cards (e.g., to find any pairs) by freeing the student from holding a large number of cards in his/her hand. The authors feel it is more appropriate to use a card rack rather than laying the cards down on the table exposing his/her hand to the other players. Rather than a strict teaching procedure, the teacher can show the student how to use the card rack and explain that the student can use a rack when it is too hard to hold and look at his/her hand. The teacher can also model the use of a rack as an aid by taking the cards off the rack as the amount of cards left in his/her hand is reduced by playing the game.

## Table 3

## Operational Definitions

### Types of Interaction Situations

(US) Unstructured: guidelines for the individuals' activities are vague and non-specific; the teacher does not provide any instructions as to who should interact with who and what activities they should engage in.

(S) Structured: the teacher provides clear and specific guidelines for the individual's activities; he/she tells certain individuals to ask specified individuals to engage in a specific game or task.

### Initiate

(+) Appropriate initiation: an individual approaches another individual(s) and verbally (nonverbal students may use nonverbal communication) asks him/her to engage in a specific activity with him/her.

(-) Inappropriate initiation: an individual does not verbalize the initiation or demands (vs. requests) that another individual engage in a specific activity with him/her.

(AI) Attempted interaction: may be positive or negative; an individual initiates some attempt at interacting with others; attempts to engage in some activity or occupy the same location, vocalizes to get attention of others (e.g., pushing another person but not merely self-defensive).

### Receive

(+) Appropriate reception: an individual either accepts (e.g., says, "Yes, I'd like to play,") or politely declines/refuses (e.g., says, "No, I do not want to play").

(-) Inappropriate reception: an individual inappropriately accepts an initiation by grabbing the game/activity/object from the individual who initiated; refusing by ignoring the initiation, pushing the initiator away, declining in a loud voice or snotty reply.

### Sustain

Level of Interaction with an Object/Game/Task:

(G) General: the individual engages in the activity (and not self-stimulation types of behaviors) but does not engage in specific activities which are functional to the game/object/task; (e.g., just looking at a game or fiddling with it).

(Ap) Appropriate: the individual engages in activities which are functional to the correct operation of the game/object/task (e.g., following the rules of the game).

Level of Social Interaction Pattern:

(A) Autistic Social Interaction Pattern Level: the individual shows little or no awareness of others or of environment; engages in self-stimulatory behavior (i.e., head banging, shaking, rocking, flapping).

(UO) Unoccupied Social Interaction Pattern Level: the individual shows some awareness of the environment but makes no attempt to interact with it (i.e., walks aimlessly, sits, looks around room or out window) may observe activities of others for a few minutes from a distance.

(O) Observational Social Interaction Level: the individual approaches others and watches their activities but makes no attempt to interact; the individual may sit or stand near the others; observation must be of a sustained nature (see definition of duration of interaction pattern).

(I) Isolative Social Interaction Pattern Level: the individual plays with toys, games or objects, but in an isolated manner; the individual makes no attempt to interact with others and is not very aware of the activities of the others; isolative behavior may be of a general or appropriate level of interaction with object/game or task.

(P) Parallel Social Interaction Pattern Level: the individual interacts in an activity independently but is closer in proximity to other individual(s) than the isolative level; the individual sits beside rather than with other individuals; the individual is fully aware of the activity of the other individual(s); the individual may or may not be engaged in the same task/game/object as the other individual(s).

(C) Cooperative Social Interaction Pattern Level: the individual interacts with others in an activity which requires mutual participation (e.g., playing with a ball, playing card games such as Old Maid); may be general or appropriate level of interaction with game/object/task.

(AU) Acted upon: the individual(s) engaged in the activity rely upon the direction and priming of one individual(s) to complete the activity; may be double scored with cooperative level of social interaction patterns.

(PD) Peer disapproval: when an individual's peers show either verbal or phyisical disapproval; may be double scored with any other level of social interaction patterns.

Duration of Interaction Patterns: amount of time an individual engages in some activity.

Terminate

Termination of Interaction:

(+) If appropriate the individual picks up, organizes and puts away the game/object/task in the correct storing place when time is up or the individual is through interacting with it. The individual makes some appropriate verbal statement (i.e., thanks for the game or I don't want to play any more).

+(AU) Acted upon: the individual is verbally directed by another cooperating peer to clean up the interaction area himself/herself and does so.

(-) When time is up or the individual is through interacting, the individual walks away leaving the toy/game/object where he/she was playing with it, picks it up and puts it away without organizing it properly and/or puts it in the wrong storage place or only terminates after repeated redirects from the teacher.

## Unscorable

Unable to score or record such as when there is not appropriate category or the behavior of concern could not be observed.

## 4. Baseline Assessment

Using the operational definitions and data sheets (Appendix B and C) baseline assessments were obtained to assess what social interaction skills the students had and what skills they needed to learn. From the baseline assessments we evaluated how the students performed in structured and "free play" (unstructured) situations (see operational definitions) along parameters of initiating, receiving, sustaining (for sustaining we assessed both the level of social interaction and appropriateness of interactions with tasks), and terminating interactions. Baseline sessions were video taped and data from each session, based on the operational definitions of interaction skills, was recorded on the data sheet portrayed in Appendix B. When all the baseline data had been collected, it was combined and recorded on a summary data sheet for each student (see Appendix C). The baseline data indicated social interaction skills the students had in their repertoires and the frequency, number and duration of the skills. The procedures are described in greater detail in Table 4.

## Table 4

## Baseline Procedure

A. "Free-play" Baseline

Class A - Baseline measures, for student 1 through student 5 were administered for three days, during "free play" period. Videotapes were taken of the students in their play area during this time. Data was collected from the videotape at a later date. (See Appendix B for example data sheet.)

Class B - Baseline measures were same as for Class A.

B. Structured Baseline

Class A - The authors felt that the students had interactional skills in their repertoires which they did not demonstrate during the "free play" baseline. To determine if the students (student 1 through student 5) had appropriate initiating and receiving skills a structured baseline was administered for three days. During this baseline students were cued by the teacher to ask another student to play a specified game. Videotapes of the baseline were taken and data was coded from these tapes at a later date. The same data sheet was used as in the "free play" baseline (Appendix B).

Class B - No structured baseline was administered.

C. Rebaseline

Class A - Rebaseline measures for student 1 through student 6 were administered for three days. The same procedure was followed as in the original baseline: videotapes were taken of the students during their "free play" periods and data was collected from these tapes at a later date (see Appendix B for example data sheet).

The purpose of the rebaseline was to assess what game skills and/or interactional skills the students had acquired, if any, during the time that elapsed between the structured baseline (Oct. 15) and the rebaseline (Feb. 7). During this time period the students had been taught games and interactional skills but not through a systematic procedure.

Class B - Rebaseline was unnecessary since no time had elapsed between the original baseline and systematic instruction.

Based upon the operational definition and the results of implementing the baseline assessments target social interaction skills were delineated for each student.

## 5. Results of Baseline Assessment

### Class A
### Baseline and Rebaseline (Pretests)

As indicated earlier baseline assessment (pretests) were administered to assess the student's pre-intervention social skill repertoire in order to determine instructional objectives for each student. A baseline was administered in Class A and then, because of a lapse of time between baseline and implementation of the program, a rebaseline was administered. The purpose of this rebaseline was to determine if the students had acquired any game or social interaction skills during the time lapse. During the time lapse there had been no formal instruction, although the students were informally taught a few games. Table 5 provides summaries of the data from each of these baseline pretests. As can be discerned from the table there were no dramatic changes in the students' game and interaction skills.

Table 6 is a summary of the free play pretest baseline measures (baseline and rebaseline data have been combined). Unfortunately, time did not permit a free play posttest baseline after intervention at the end of the school year. Analysis of the data presented in Table 6 was used to determine what skills to teach each student. For example, data indicated Student 5 ($S_5$) needed to learn at least the following skills:

1. In four play sessions $S_5$ made no initiations to other Ss; this is an important social interaction skill because it leads to cooperative play; therefore, the number of initiations needed to be increased.
2. In relation to #1 above, $S_5$ engaged in isolative play 75% of the time and in observational play 25% of the time; $S_5$ spent too much time engaged in isolative play and needed to be taught cooperative play skills.

## Table 5 - Summary of Free Play Baseline and Rebaseline (Pretest) Data
## (Class A)

| | | Initiate | Receive | Activities | Level of Toy Play | Level of Social Play | Sustain | Terminate |
|---|---|---|---|---|---|---|---|---|
| $S_1$ | baseline | 3 play sessions<br>1 initiation<br>100% approp. | no opportunity to receive | records 66%<br>cards 34% | 100% approp. | parallel 66%<br>cooperative 34% | 8.33 minutes per activity | 100% approp. |
| | rebaseline | 2 play sessions<br>2 initiations<br>100% approp. | no opportunity to receive | books 34%<br>cards 66% | 100% approp. | cooperative 100% | 6.00 minutes per activity | 100% approp. |
| $S_2$ | baseline | 3 play sessions<br>1 initiation<br>100% approp. | no opportunity to receive | records 66%<br>books 34% | 100% approp. | parallel 66%<br>isolative 34% | 8.33 minutes per activity | 100% approp. |
| | rebaseline | 3 play sessions<br>2 initiations<br>100% approp. | 2 initiations from others<br>50% rec'd approp.<br>50% rec'd inapprop. | butterflies 28%<br>records 14%<br>cards 14%<br>picture cards 28%<br>books 14% | 100% approp. | isolative 60%<br>parallel 20%<br>cooperative 20% | 4.85 minutes per activity | 80% approp.<br>20% inapprop. |
| $S_3$ | baseline | 3 play sessions<br>0 initiations | 1 initiation from others<br>100% rec'd approp. | records 33%<br>games 33%<br>cards 33% | 100% approp. | isolative 33%<br>parallel 33%<br>cooperative 33% | 8.33 minutes per activity | 100% approp. |
| | rebaseline | 3 play sessions<br>1 initiation<br>100% approp. | 2 initiations from others<br>100% rec'd approp. | records 28%<br>cards 28%<br>books 42% | 100% approp. | isolative 28%<br>parallel 14%<br>cooperative 56% | 4.85 minutes per activity | 100% inapprop. |
| $S_4$ | baseline | 3 play sessions<br>1 initiation<br>100% approp. | no opportunity to receive | finger 33%<br>silly puddy 33%<br>puzzle 33% | 100% approp. | autistic 34%<br>isolative 66% | 8.33 minutes per activity | 0 scorable terminations |
| | rebaseline | 3 play sessions<br>0 initiations | no opportunity to receive | book 32%<br>morocca 32%<br>magazine 16%<br>headphones 16% | 40% general<br>60% approp. | unoccupied 20%<br>isolative 80% | 5.66 minutes per activity | 0 scorable terminations |
| $S_5$ | baseline | 2 play sessions<br>0 initiations | 1 initiation from others<br>100% rec'd approp. | butterflies 50%<br>cootie 50% | 100% general | isolative 50%<br>observat. 50% | 7.5 minutes per activity | 0 scorable terminations |
| | rebaseline | 2 play sessions<br>0 initiations | no opportunity to receive | cootie 100% | 100% approp. | isolative 100% | 11.0 minutes per activity | 100% approp. |
| $S_6$ | baseline<br>(no rebaseline) | 4 play sessions<br>1 initiation<br>100% approp. | no opportunity to receive | paddleball 12.5%<br>cards 25%<br>ball 12.5%<br>yoyo 25%<br>books 12.5%<br>games 12.5% | 12.5% general<br>87.5% approp. | isolative 62.5%<br>parallel 12.5%<br>cooperative 25% | 4.25 minutes per activity | 34% inapprop.<br>66% approp. |

Table 6 - Summary of Free Play Pretest Data for Baseline and Rebaseline Combined (Class A)

| | Initiate | Receive | Activities | Level of Toy Play | Level of Social Play | Sustain | Terminate |
|---|---|---|---|---|---|---|---|
| $S_1$ | 5 play sessions<br>4 initiations<br>100% approp. | no opportunity to receive | records 33%<br>cards 50%<br>book 17% | 100% approp. | parallel 33%<br>cooperative 67% | 7.16 min. per activity | 100% approp. |
| $S_2$ | 6 play sessions<br>3 initiations<br>100% approp. | 2 initiations from others<br>50% rec'd approp.<br>50% rec'd inapprop. | records 30%<br>book 20%<br>butterflies 20%<br>cards 10%<br>picture cards 20% | 100% approp. | isolative 50%<br>parallel 37.5%<br>cooperative 12.5% | 6.55 min. per activity | 83% approp.<br>17% inapprop. |
| $S_3$ | 6 play sessions<br>1 initiation<br>100% approp. | 3 initiations from others<br>100% rec'd approp. | records 30%<br>game 10%<br>cards 30%<br>book 30% | 100% approp. | isolative 30%<br>parallel 20%<br>cooperative 50% | 5.9 min. per activity | 33% approp.<br>67% inapprop. |
| $S_4$ | 6 play sessions<br>1 initiation<br>100% approp. | no opportunity to receive | finger 11%<br>silly puddy 11%<br>puzzle 11%<br>book 33%<br>norocca 22%<br>headphones 11% | 43% general<br>57% approp. | unoccupied 12.5%<br>autistic 12.5%<br>isolative 75% | 7.37 min. per activity | 0 scorable terminations |
| $S_5$ | 4 play sessions<br>0 initiations | 1 initiation from others<br>100% rec'd approp. | butterflies 25%<br>cootie 75% | 33% general<br>66% approp. | observational 25%<br>isolative 75% | 9.25 min. per activity | 100% approp. |
| $S_6$ | 4 play sessions<br>1 initiation<br>100% approp. | no opportunity to receive | paddle ball 12.5%<br>cards 25%<br>ball 12.5%<br>yo-yo 25%<br>book 12.5%<br>game 12.5% | 12.5% general<br>87.5% approp. | isolative 62.5%<br>parallel 12.5%<br>cooperative 25% | 4.25 min. per activity | 66% approp.<br>34% inapprop. |

3. $\underline{S}_5$ engaged in only two different activities; it was a goal of the program to increase the range of games and activities in the $\underline{S}_5$'s repertoire.
4. $\underline{S}_5$ engaged in appropriate toy play 66% of the time, but engaged in general play 33% of the time; another goal of the program was to increase appropriate play so that $\underline{S}_5$ would engage in it almost 100% of the time.
5. $\underline{S}_5$ engaged in an activity for an average of 9.5 minutes; this indicated that $\underline{S}_5$ was able to sustain an activity.
6. Finally, $\underline{S}_5$ appropriately terminated an interaction 100% of the time indicating no problem in regards to termination with an activity or object. However, $\underline{S}_5$ never engaged in cooperative play and therefore it is uncertain as to whether $\underline{S}_5$ had the skills to appropriately terminate an activity with another individual.

### Structured Baseline

The purpose of the structured baseline was to determine if the students had social interaction skills (e.g., initiating and receiving) in their repertoires which were not demonstrated in the free play pretest measures. Data from the structured baseline can be summarized as follows (Table 7):

Table 7

| | Ability to Initiate | Ability to Receive |
|---|---|---|
| $\underline{S}_1$ | YES | ? |
| $\underline{S}_2$ | YES | YES |
| $\underline{S}_3$ | YES | YES |
| $\underline{S}_4$ | ? | NO |
| $\underline{S}_5$ | ? | YES |

It is questionable as to how valuable the structured baseline data was. The question marks indicate that the skill was not demonstrated by a student either because of the skills absence and/or lack of sufficient time to fully evaluate the student's repertoire.

### Class B

### Baseline

Table 8 is a summary of the free play baseline measures taken before the program was implemented. Evaluation of Table 8 indicated which skills students had in their repertoires and which skills should be taught. Evaluation of Table 8 for Class B was conducted in a similar manner to Tables 5 and 6 for Class A (see previous Class A Baseline results discussion).

Table 8 - Summary of Free Play Baseline Data
(Class B)

| | Initiate | Receive | Activities | Level of Toy Play | Level of Social Play | Sustain | Terminate |
|---|---|---|---|---|---|---|---|
| $\underline{S}_7$ | 2 play sessions<br>4 initiations<br>100% approp. | no opportunity to receive | darts 50%<br>records 50% | 100% approp. | isolative 50%<br>cooperative 50% | 15 min. per activity | 100% approp. |
| $\underline{S}_8$ | 3 play sessions<br>7 initiations<br>42.1% approp.<br>15.8% inapprop.<br>42.1% unscorable | 4 initiations from others<br>25% approp.<br>25% inapprop.<br>50% unscorable | viewmaster 33%<br>darts 11%<br>happy face 11%<br>wizzard of oz 22%<br>puzzle 22% | 55% approp.<br>45% general | isolative 44.4%<br>observational 11%<br>cooperative 55% | 5.1 min. per activity | 78% approp.<br>11% inapprop.<br>11% unscorable |
| $\underline{S}_9$ | 3 play sessions<br>1 initiation<br>100% approp. | 1 initiation from others<br>100% approp. | domino 25%<br>darts 25%<br>book 50% | 75% approp.<br>25% general | isolative 75%<br>cooperative 25% | 9.2 min. per activity | 50% approp.<br>25% inapprop.<br>25% unscorable |
| $\underline{S}_{10}$ | 3 play sessions<br>5 initiations<br>75% approp.<br>25% unscorable | 5 initiations from others<br>75% approp.<br>25% unscorable | darts 37%<br>happy face 37%<br>viewmaster 16% | 100% approp. | isolative 38%<br>parallel 12%<br>observational 30%<br>cooperative 30% | 6 min. per activity | 88% approp.<br>11% inapprop.<br>11% unscorable |
| $\underline{S}_{11}$ | 3 play sessions<br>40% approp.<br>40% inapprop.<br>20% unscorable | 4 initiations from others<br>25% approp.<br>25% inapprop.<br>50% unscorable | viewmaster 80%<br>book 10%<br>happy face 10% | 100% approp. | isolative 50%<br>parallel 12.5%<br>cooperative 37.5% | 8 min. per activity | 33% approp.<br>50% inapprop.<br>17% unscorable |

## 6. Additional Assessment

Data collected during instruction, to be described in greater detail later, provided additional information regarding the students' skills. That is, analysis of student errors during instruction provided information concerning skills students had in their repertoire prior to instruction.

Based upon the operational definitions and baseline assessments target social interaction skills for each student were delineated. The next section (IV) entitled "Teaching Isolative and Cooperative Interaction Skills," will specify instructional procedures for teaching targeted social interaction skills. A discussion of general considerations for designing an instructional program followed by examples of specific procedures the authors used to teach isolative and cooperative social interaction and game skills to severely handicapped students, will be presented along with a discussion of the results of the authors' program.

# IV. TEACHING ISOLATIVE AND COOPERATIVE INTERACTION SKILLS

## A. General Considerations for Designing an Instructional Program

### 1. Environmental Facilitators and Impedors of Social Interactions

#### a. Affect of Peers' Functioning Level on Social Interactions

The functioning level of peers can have a significant effect on people's social interactions (Wahler, 1967; Morris and Dolker, 1974). Obviously, people who have skills related to cooperative interaction patterns will not readily engage in those skills unless either their peers have skills related to cooperative interactions, or the skilled individuals can direct their unskilled peers through the tasks and necessary interactions. Conversely, people who do not have skills related to cooperative interaction patterns may engage in cooperative social interactions if a peer(s) who has the skills directs them through the necessary tasks and interactions.

At this point it should be noted that the social interaction paradigm described thus far is oversimplified and does not adequately describe any specific social situation. That is, most social situations involve a great deal of "give and take" between the participants in terms of gestures, humor, small talk, gossip, "emotion," "affect," and general conversation. Also, in many instances, individuals will shift from task to task or from one social interaction pattern to another quite rapidly without distinct points of initiation or termination. However, as previously contended, given that a paradigm which systematizes social interactions does not encompass all the complexities of social interactions it does not necessarily follow that the paradigm is incapable of providing effective social interaction skill instruction. Once the instructional program has taught individuals basic social interaction skills the natural environment should teach them the complex and sophisticated skills. That is, with some prompting from adult authority figures skilled peers should be able to teach unskilled peers the complexities of the social interactions (Whaler, 1967; Morris and Dolker, 1974). Unfortunately, severely handicapped individuals are often segregated or clustered in institutions, self-contained schools, group homes, etc., which do not afford them ready contact with peers who could teach them sophisticated social interaction skills.

The implication is that an essential component of social interaction instructional programs should be pairing severely handicapped individuals with peers who have appropriate social interaction skills. With prompting from adult authority figures skilled peers could teach basic (initiating, receiving, sustaining, terminating) and sophisticated social interaction skills to relatively unskilled peers. To facilitate this instructional strategy characteristics of severely handicapped individuals which may cause them to be intolerable to their peers (e.g., tantrums, hitting, bad breath) should be decreased; severely handicapped individuals' direction following and observational learning skills should be shaped to a level where they can benefit from peer instruction; and rudimentary initiating, receiving, sustaining and terminating skills may have to be taught. A potential advantage to this instructional strategy is that use of peer instructors should facilitate the maintenance and generalization of social interaction skills.

b. Task Availability

The tasks or activities available to people will influence, and in some cases determine, the social interactions they engage in (Kawin, 1934; Quilitch and Risley, 1973; Updegraff and Heabst, 1933; Van Alstene, 1932; Zimmerman and Calovin, 1970; Hake and Vulelich, 1973; Ellis, 1973). If only tasks more applicable to isolated social interaction patterns than to cooperative social interaction patterns (e.g., finger paints) are available people will obviously more readily engage in skills related to isolative social interaction patterns. On the other hand, if only tasks more applicable to cooperative social interaction patterns are available (e.g., cooperative games), people will most likely engage in skills related t[illegible]operative social interaction patterns. In addition, if only tasks people do not have the skills or the desire to engage in are available, they will not readily engage in the tasks of social interactions which revolve around them.

c. Selection of Tasks to Teach Social Interaction Skills Through

As discussed earlier, an essential component of a social interactions program should be to teach people to engage in tasks related to isolative and cooperative interactions. However, it would not be appropriate to attempt to teach individuals tasks inappropriate to their current functioning level. That is, it would not be appropriate to teach individuals with only rudimentary language skills reading as an isolative task and monopoly as a cooperative task. One should choose tasks appropriate to individuals' functioning levels in such areas as motor skills, language skills and cognitive skills. Ellis (1973) suggests that tasks which are too easy or too sophisticated for individuals are not appropriate. However, tasks just at or above individual's current functioning level should hold their interest and pace skill development.

One basic component of developing a social interaction program should be to determine individuals' functioning levels in such skill areas as motor, language, and cognition. Potentially, many procedures could be used to determine individuals' functioning levels in various skill domains. Administering a battery of tests might be appropriate if individuals are new to a program; however, if they are already involved in programming, their skills levels in ongoing programs could be used as indicators of their functioning level. In fact, tasks which had been, or are being, taught can be restructured such that they constitute the social interaction tasks. For example, if individuals are/ or have learned basic motor patterns (e.g., rolling, turning, grasping) it would be appropriate to select or derive tasks which involve use of the patterns (Zimmerman and Calouine, 1971). If individuals are/or have learned to label objects one could select or devise isolated and cooperative tasks which involve labeling. If individuals are learning or have learned object labeling, money, self-care skills, etc., one could derive tasks which encompass all these skills to teach social interaction skills through. In other words, the social interaction program should be structured around the skills and tasks individuals have learned or are being taught. Teaching of social interaction skills should be made an integral, not a separate part, of a total curriculum.

There is a problem with teaching severely handicapped individuals to perform tasks appropriate to their functioning level. If individuals engage in tasks at their functioning level but these tasks are not CA appropriate the individuals may be perceived by others as "retarded" or "different." However, if CA appropriate tasks are too sophisticated for individuals in terms of required skill levels in such areas as motor, cognitive, and language, options are quite limited.

It may be helpful to consider each social interaction pattern (e.g., autistic, isolative, cooperative) as consisting of a hierarchy of increasingly more sophisticated or age appropriate tasks. For example, an isolative social interaction task hierarchy may be: a) acting upon objects indiscriminately; that is, looking at, smelling, touching all objects without regard to the function of the object; b) functionally using objects, such as rolling a ball, stirring and eating with a spoon; c) serving alternative functions for objects, such as using an overcoat as a pillow; d) and so on. Within this framework, although individuals may initially engage in tasks below their age norms, with intensive education their skill levels should improve and they should have the skills to engage in tasks more appropriate to their age norms.

Another instructional option is to re-structure sophisticated age appropriate tasks so that they are appropriate to individuals' skill levels. For example, the rules of common card games can be simplified or the number of pieces to a puzzle can be decreased to fit individuals' functioning levels. As the individuals' functioning levels increase the rules of the games can be made increasingly more sophisticated and more pieces may be added to the puzzle.

Social interaction programs should use tasks and materials that have reinforcement value. Choosing tasks on the basis of their reinforcement value involves selecting tasks and materials students will readily interact with, preferably in freeplay situations. (A free play situation is referred to here as one where the task is available, but the student is neither prompted to engage in it nor externally reinforced for engagements.) On many occasions, teaching skills through tasks with reinforcing value may involve teaching skills through toys, games, music and songs. Games, toys, music and songs which require the performance of skills may be used to augment academic programming and as recreational activities to provide addtional practice of skills in in a variety of settings.

Some criteria for selecting potentially reinforcing tasks are: a) tasks should be novel and offer results that are not always predictable; and b) tasks should be matched to student functioning levels. Tasks which are either too easy or too sophisticated are not appropriate. However, tasks just above current functioning levels should hold interest and pace development. Tasks should allow for active engagement and should manifest cause and effect relationships.

There are at least two major advantages to teaching skills through tasks with reinforcing value: 1) skills may be reinforced by allowing continued performance of the task and/or interaction with the task materials instead of relying upon teacher imposed reinforcers; and 2) students are more likely to interact with the task materials and thus perform the skills taught outside of controlled instructional situations.

## 2. Insuring Performance of Skills Across a Variety of Environmental Settings

As previously stated in the review of the literature, the severely handicapped individual seldom performs appropriately in home - living, recreational and vocational environments due to inadequate social interaction skills (Seeley, 1971; Goldstein, 1964). There is a need for strategies which will insure that the social interaction skills taught are in fact performed across a variety of environments.

For purposes of simplicity it may be appropriate to categorize social interaction situations into four basic situations: a) school; b) recreational; c) home-living; d) vocational.

Each situation can be analyzed into the basic components skills of social interactions previously delineated. For instance, in each situation there should be an initiation. That is, there should typically be a greeting followed by the initiation of a school, vocational, recreational or home-living task. To sustain the interaction individuals must be able to perform school task(s), vocational task(s), recreational activity(s), or home-living task(s). Termination of each situation typically involves a salutation and in most cases the completion of the task and/or if necessary the cleaning up of the interaction area. Each situation can be further analyzed to determine the sophistication of the tasks relative to the individuals' skill levels and the social interaction skills of other individuals in the task situation.

In addition, social interaction situations may be divided into unstructured and structured situations. In unstructured situations individuals engage in a task without cues from authority figures or external reinforcement. In a structured situation individuals are cued by authority figures to engage in selected activities and typically frequently reinforced for selected behavior. The major difference between these two situations is the locus of control. In the unstructured situation individuals are in control while in the structured situation behavior is primarily controlled (directed) by authority figures. Individuals should be able to perform social interaction skills in both unstructured and structured situations.

One strategy to insure that students can perform social interaction skills across interaction situations is to systematically require them to use the skills across situations. To implement this strategy first list potential school, recreational, home-living and pre-vocational tasks that frequently occur in the students' everyday environments. Then systematically teach and require students to use appropriate social interaction skills across the listed situations. Continually search for and devise new situations. The following is a short list of sample school, recreational, home-living, and pre-vocational tasks students could be required to use social interaction skills in throughout the day.

School Setting: Math Class

Initiating:

1. a student or teacher recognizes the appropriate time for math class and communicates this information to the other students
2. the teacher designates an area for math instruction
3. the teacher gives the students directions regarding their math instruction/assignment
4. the students may request help from the teacher

Receiving:

1. the students receive the initiation for math class, get their math materials ready and go to the designated area for instruction
2. the students receive the teacher's instructions regarding their instruction/assignment
3. the teacher receives the students' initiations for help and either gives assistance or declines the initiation

Sustaining:

Math class is generally sustained by performance of a set of math tasks. Instruction may provide opportunities for isolative, observational and cooperative interaction skills.

Terminating:

1. students are given feedback concerning their days' performance
2. students clean up the instructional area
3. students help put away the materials used by the group as well as their own materials
4. students get ready for the following activity period

Recreational Setting: Visits to the public library

Initiating:

1. recognition of the appropriate time to go to the library and communicating the information to other students, friends or family members
2. gather books needed to be returned
3. go to the bus, car or other mode of transportation

Receiving:

1. students, friends or family members receive the initiation to go to the library and gather their books

Sustaining:

1. return old books
2. appropriate location and selection of new book(s)
3. appropriate isolative scanning and reading skills
4. share book selection(s) with other students, friends or family members

Terminating:

1. check out new books
2. go back to bus, car or other mode of transportation

Home-Living Setting: Dressing skills

Initiating:

1. recognition of time and place to dress
2. deciding the appropriate clothes to wear
3. preparation of the clothes, shoes, etc.
4. communicate need for clothing article to parent
5. asking for help in getting dressed

Sustaining:

1. putting the clothes, shoes, etc., on

Terminating:

1. cleaning up the clothes that had been worn previously by putting them in appropriate place(s)

Pre-Vocational Setting: Juice time

Initiating:

1. a student recognizes the appropriate time for juice and communicates this information to the other students and teacher
2. student or teacher designates an area for juice time
3. students perform their jobs in preparation for juice (i.e., making the juice; passing out the cups, napkins and cookies)

Receiving:

1. the students receive the initiation for juice time and perform their jobs (see initiating)

Sustaining:

1. drink the juice and eat the cookies
2. opportunity for casual social conversations (discussion of past events and future plans can be encouraged; appropriate initiating and receiving interactions can be praised)

Terminating:

1. clean up juice time area
2. put all materials away in appropriate places
3. throw away all garbage
4. get ready for the next activity period

It must be emphasized that these are only sample situations and they may be inappropriate for many students. Thus, it is necessary that you adapt the program to your students through selecting appropriate situations.

## B. General Procedures Used in the Authors' Program

The above discussion leads to the following guidelines that were followed in developing the social interaction program presented below:

1. Generally, individuals perform social interaction skills in relation to specific tasks. If the individuals cannot perform the tasks, it is unlikely that they will perform or learn social interaction skills. Thus, one of the first components of the social interaction program should be to teach the individuals to perform specified tasks. Then they should be taught the social interaction skills related to the tasks. The tasks selected should be carefully matched to the student's functioning level.

2. Individuals should be taught skills related to isolative and cooperative social interaction patterns and to engage in them at appropriate times, places and frequencies.

3. In relation to social interactions which involve others, individuals should be taught to appropriately verbally initiate, receive, sustain and terminate the interactions. However, nonverbal students should be taught appropriately nonverbal initiating, receiving, sustaining and terminating skills.

4. When teaching individuals social interactions they should be paired with peers who with prompting from adult control figures can teach basic (initiating, receiving, sustaining and terminating) and complex social interaction skills.

5. Individuals should be taught social interaction skills which are appropriate across the environments (home, school) the individuals frequently inhabit.

Based on the preceding guidelines general instructional phases and teaching procedures were developed. First a general description of the instructional phases and definitions of the instructional procedures is presented, then examples procedures for teaching isolative and cooperative games will be provided. These specific examples will include: a) summary of component skills taught; b) a list of possible activities the component skills can be taught through; c) a sample task analysis of a specific skill; d) a sample teaching procedure for a specific skill; and e) results.

It must be emphasized that the task analysis and instructional procedures that follow are only intended as guidelines for teaching social interactions. It is expected that readers will have to adapt and develop task analysis and instructional procedures suited to the needs of their students.

The program described herein was divided into three phases. Each phase is described in detail below:

Phase I - During this phase students were taught to socially interact and play a game with the teacher. The authors felt that learning the games or tasks was a prerequisite to learning the social interactions which revolve around them. The teacher modeled proper initiation and termination skills, but students were not required to perform these skills until Phase II.

It should be emphasized that students were given a "choice" as to whether or not they wanted to play a particular game or with an object. It was the students free time and they could choose to do whatever they wanted, however, students' were not allowed to waste free time by doing nothing at all. That is, students were encouraged to engage in many different activities. In some cases it was necessary to intervene when students engaged in an activity too frequently or too infrequently. It was also necessary at times to coax a student to play a game with the teacher.

While teaching the game to students the teacher initially acted upon the student (i.e., verbally and physically directed the student through each step of the game or activity). However, after students were able to play the game, they were taught to act upon (direct) the teacher. This was accomplished through the teacher asking the student what to do next and/or by not following the directions of the student or the rules of the games. For example, if the teacher and student were playing Old Maid and it was the teacher's turn, the teacher would ask the student, "What do I do now?" and the student could respond, "Pick a card." Then, the teacher could respond by picking a card from his/her own hand, and the student should say, "No, pick a card from my hand."

There are several reasons the authors feel that being able to act upon others is a necessary skill. First, it facilitates peers being able to teach the game to other peers. Individuals with high level social skills can then teach games and social skills to peers with fewer social skills. Secondly, once students have the skills to play the game and act upon their environment, they should be able to initiate their own social behavior.

This should increase the frequency of appropriate social behavior. Finally, being able to act upon others should increase students' abilities to control their own environment and not allow others to inappropriately manipulate them.

Phase II - In this phase the environment was structured to facilitate student use of social interaction and game skills taught in Phase I. For cooperative games, the teacher instructed one of the students to ask another student to play a particular game. The teacher observed the initiation between the students and intervened only when the students initiated or accepted/declined the initiation inappropriately. In cases where errors occurred the teacher modeled the proper behavior for the students and had them repeat the initiation following the model. The students then continued the response chain (i.e., getting the game materials, deciding on a play area, setting up the game, playing the game and terminating the game). Again the teacher observed the students' responses and only intervened when students inappropriately performed. If an error occurred the teacher first provided a verbal prompt for the correct response, and then if necessary modeled and/or primed the response.

On Phase II, for isolative games, the teacher provided opportunities for students to play a game or with an object and/or suggested that they play with a game or object.

Phase III - This phase was designed to teach further performance and/or modifications of games and social skills learned in Phases I and II. Organizing tournaments, offering special prizes, altering rules, increasing or decreasing the number of people participating, and changing the location of the activity are a few game alterations that were employed.

Table 9 provides definitions of the general instructional procedures used to teach isolative and cooperative game and social interaction skills.

## C. Isolative Games

### 1. Summary of Component Skills Taught

As discussed earlier, isolative activities may be thought of as consisting of at least the four basic components listed below:

a. recognition of the appropriate time and place for a particular isolative activity
b. selecting and locating an available game/toy/object appropriate for isolative play
c. sustaining appropriate interaction with the selected toy/game/object
d. properly terminating the activity

The program the authors have developed attempts to incorporate these components skills into the teaching of isolative games.

### 2. List of Sample Isolative Activities

The following list of isolative games and activities are offered as suggested materials that could be incorporated into a social interaction program. This list is far from complete and certainly other materials could and should be used when appropriate.

## Table 9

## Definition of Instructional Procedures

Correct Response (+) was scored when student(s) perform the chain of responses correctly and in sequence under the following conditions:

1. Teacher cue served as a signal for the desired response or chain of desired responses.
2. Teacher may reword (redirect) a verbal cue before any response is emitted by S. For example, a T cue might be, "I want you to find your pairs." "I want you to find the cards that look the same." This may accomplish:
   a. learning the meaning of words (e.g., cards) through context (e.g., cards that look the same)
   b. reducing the confusion of the meaning of a verbal cue, thus giving S the opportunity to demonstrate his/her ability to perform the task.

Incorrect Response (-) was scored when:

1. S did not emit a response after a T cue or redirect.
2. S emitted an undesired response(s) after a T cue or redirect.

Procedures After Error:

1. Verbal Prompt (VP) - T indicated to S he/she had made an error by providing an additional verbal cue. For example, S may know that he/she should shuffle the cards before dealing, but he/she does not have the cards all facing the same direction. A verbal prompt might be, "No (name), you must put the cards all the same way/direction before you shuffle them."
2. Modeling (M) - Modeling has been defined as "the training technique or operation of demonstrating a response or chain of responses to a subject and then directing the subject to immediately imitate the performance." (White, 1971, p. 96) Modeling was used to teach selected verbal and nonverbal responses.
3. Priming (P) - Priming is the procedure of guiding S physically through a response or response sequence. Priming was used to teach selected nonverbal behaviors.

Fading - Fading refers to a process of gradually changing the stimuli controlling a response until the response is controlled by different stimuli. Physical prompts were faded by gradually withdrawing T's physical guidance, thus gradually requiring S to perform more of the responses unaided. Models were faded by gradually presenting a less demonstrative model, requiring S to successively perform more of the response without T assistance.

The following sections will describe sample procedures for teaching isolative and cooperative game and social skills.

It is necessary that pre-assessment is made to determine if the individual has the prerequisite skills necessary for learning the game or activity. If the student does not, these skills may have to be taught first, the game may be modified to fit the skills of the student or a different game or activity could be chosen. Through the teaching of the game or activity, the student should learn social interaction skills (i.e., initiating, receiving, sustaining and terminating).

One final consideration needs to be made when selecting the games and activities. Besides being appropriate to the functioning level of the individual, the game or activity should be appropriate to the CA of the individual. However, it may be necessary to start with games and activities which are at the individual's functioning level and progress toward CA appropriate activities.

### Games/Activities Commercially Available

Blow Bubbles
Books
Bottle Cutting Kits
Candle Making Kits
Ceramics
Chemistry Labs
Crocheting Kits
Decoupage
Dip-a-Flower
Dolls and Accessories
Embroidery Kits
Finger Painting Kits
Hoola Hoop
Kite
Knitting Kits
Leather Craft Kits
Marbles
Microscope Sets
Models
Mosaic Wire Art
Needle Craft Kits
Paper Dolls
Paper Flower Maker
Pin Ball Machines
Play-do
Puzzles
Sew Design Kits
Silly Puddy
Slinky
Soap Decorating Kits
Viewmaster
Weaving Kits
Wood Art Kits
Yo-yo

### Card Games

Varieties of Solotaire

### Sports Activities

Bike riding
Bowling
Fishing
Golf
Gymnastics
Ice Skating
Jogging
Jump rope
Playground equipment (e.g., swings, sand boxes, etc.)
Ride horseback
Snow ski
Water ski

### Isolative Games/Activities/Hobbies

Collect coins
Collect stamps
Cook
Crochet
Knit
Musical Instruments
Paint
Photography
Sew
Sketch (draw)
Stereo equipment
Stilts

### 3. Sample Task Analysis - Viewmaster

A sample task analysis will be presented for "viewmaster." Similar task analyses for other isolative games may be constructed using the presented task analysis as a guide.

Materials Needed:

1. Viewmaster pack - including a selection of reels packaged in envelopes. Each envelope has a picture on it depicting the reel's content.
2. An area artificially or naturally lighted.

Prerequisite Skills:

1. Delayed imitation
2. Visual discrimination

Phase I - Teaching S to appropriately interact and play with an isolative game.

Part A[5] - T models toy/game initiation and selection (used Part A at the beginning of each instructional period during Phase I).

| | Arrangement | T Cue | S or T response |
|---|---|---|---|
| Step 1 | Free time | "(name) how would you like to learn to play with a really far out toy?" | S responds "sure/ok" or some similar response |
| Step 2 | Subsequent event to Step 1 | "Let's go over to the game shelf and I'll show you the game/toy." | S and T go over to the game shelf |
| Step 3 | Subsequent event to Step 2 | "I'm looking for the viewmaster. Here it is, have you ever played with one of these before?" | S verbally responds yes or no. |
| Step 4 | Subsequent event to Step 3 | "That's fine. Let's find a good place where we can play. How about over there?" (chooses a spot available during free time that is near a light or window) | S and T go to play area they decide on. |

---

[5] Part A is universal to the task analysis of all isolative games. Underlined words may be substituted by terms specific to each game.

Part B - T models termination skills (use Part B at the end of each instructional period during Phase I).

| | Arrangement | T Cue | S or T Response |
|---|---|---|---|
| Step 1 | Appropriate time for terminating the task (i.e., end of free time or completion of viewing a reel) | "All right, free time is over/ if you're done playing with the viewmaster, what should you do with all this stuff?" (T points to viewmaster and reel packets) | S respond, "Put it away," or some similar response. |
| Step 2 | Subsequent event to Step 1 | "All right, let's put it away. First we gather all the materials together." (put reels back into envelopes) | S and T gather and pack the viewmaster parts appropriately |
| Step 3 | Subsequent event to Step 2 | Now let's put it back in the game shelf where we found it." | S and T return to the game shelf and put viewmaster and envelopes in an appropriate spot. |

Part C - Teaching S to appropriately play with an isolative game/toy. T acts upon S at first and then gradually fades his/her verbal prompts.

| | | | |
|---|---|---|---|
| Step 1 | Completion of Phase I, Part A | "This is a viewmaster. Can you say viewmaster?" | S correctly verbalizes the response, "viewmaster" |
| Step 2 | Subsequent event to Step 1 | "Each of these envelopes has a reel in it. Pick an envelope." | S selects one envelope |
| Step 3 | Subsequent event to Step 2 | "Good. See the picture on the envelope of the Wizard of Oz? What do you think this reel is going to be about?" | S responds, "about the Wizard of Oz," or some similar response. |

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[6] Part B is universal to the tasks analyses of all isolative games.

| | Arrangement | T Cue | S or T Response |
|---|---|---|---|
| Step 4 | Subsequent event to Step 3 | "Okay. This reel is going to be about the Wizard of Oz. Now we must put the reel in the viewmaster to see the pictures. The first thing we must do is find the top of the reel. Can you find it?" | S responds by finding the top of the reel |
| Step 5 | Subsequent event to Step 4 | "Good. Now put the reel in the slot keeping the top part sticking out." | S responds by correctly putting the reel in the slot of the viewmaster. |
| Step 6 | Subsequent event to Step 5 | "Great. Now look into the viewmaster. Hold it up to the light/window." | S looks into the viewmaster correctly to view the picture. |
| Step 7 | Subsequent event to Step 6 | "Each reel has 7 pictures. When you are done looking at one picture you can pull the trigger and see a new picture. Do you think you can do that?" | S correctly manipulates the trigger to view the next picture. |
| Step 8 | Subsequent event to Step 7 | "When you have looked at all 7 pictures, take the reel out of the viewmaster and put it back in the envelope." | S takes the reel out of the viewmaster and puts it in the envelope. |

Phase II - Structuring the environment so that S can use those game skills taught in Phase I. T observes S.

| | Arrangement | T Cue | S or T Response |
|---|---|---|---|
| Step 1 | Free time | "(Name) you have free time now. I have a new reel that you can look at, Man on the Moon. Do you want to look at it?" | S appropriately accepts or declines; if S accepts, he/she continues the response chain. |
| Step 2 | Subsequent event to Step 1 | | S takes the reel from T. |

| | Arrangement | T Cue | S or T Response |
|---|---|---|---|
| Step 3 | Subsequent event to Step 2 | | S goes to game shelf and finds the viewmaster. |
| Step 4 | Subsequent event to Step 3 | | S finds a play area near a light or window. |
| Step 5 | Subsequent event to Step 4 | | S takes the reel out of the envelope. |
| Step 6 | Subsequent event to Step 5 | | S puts the reel into the viewmaster appropriately. |
| Step 7 | Subsequent event to Step 6 | | S looks into the viewmaster to see the picture. |
| Step 8 | Subsequent event to Step 7 | | S pulls the trigger to see each of the 7 pictures on the reel. |
| Step 9 | Subsequent event to Step 8 | | S takes the reel out of the viewmaster and puts it back in the envelope. |
| Step 10 | Subsequent event to Step 9 | | S puts the viewmaster and reel away in appropriate spots. |

### 4. Sample Instructional and Measurement Procedure - Viewmaster

The two phases of the instructional procedure for viewmaster were as follows:

Phase I - Teaching S to initiate and play with an isolative game/toy.

Teaching S to play with the viewmaster and to initiate, sustain and terminate the interaction. When S reaches criterion on the viewmaster and the related interaction skills in Phase I, S is taught a second activity/game in Phase I while concurrently being advanced to Phase II for the viewmaster.

Phase II - Structuring the environment to provide S the opportunity to play with the viewmaster.

Provide environmental facilitators (e.g., games, toys, time encouragement) which allow S to initiate, sustain and terminate an appropriate isolative activity.

An example of how to apply the instructional procedure will be provided for selected parts of Phase I and II. From these examples it is hoped that it is clear how to apply the procedure to each step of the task analysis for viewmaster.

## Phase I

### Part A

#### Step 2

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
| Subsequent event to Step 1 (e.g., S has received T's initiation) | "Let's go over to the game shelf and I'll show you the toy/game." | S follows T over to the game shelf. If S appropriately follows T, continue response chain (Go to Step 3). If S fails to respond appropriately follow instructional procedure below:<br>a. T uses verbal prompt (e.g., T cue, "S name, come over to the game shelf and I'll show you the game/toy." If S goes over to the game shelf after the verbal prompt, continue response chain (Go to Step 3). If S fails to respond appropriately, go to part b.<br>B. T models the desired response (e.g., T walks over to S and says, "Look, walk over to the game shelf like I do.") If S appropriately imitates model, continue response chain (Go to Step 3). If S fails to imitate model, go to part c. |

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
|  |  | c. T physically primes S through the desired response (e.g., T takes S's hand and guides him/her over to the game shelf). If priming not appropriate, T may continue modeling until he/she feels it is no longer appropriate. |

**Criterion:** S will complete the response chain with or without verbal prompts, models and/or primes.

**Part B**

**Step 1**

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
| Appropriate time for terminating the task (e.g., end of free time or completion of viewing a reel) | "All right, free time is over/if you're done playing with the viewmaster what should you do with all this stuff? (T points to the viewmaster and reel packets). | S responds "Put it away" or some similar response. If S appropriately responds, continue the response chain (Go to Step 2). If S fails to emit the desired response, follow instructional procedure below:<br>a. T uses verbal prompt (e.g., "S name, I asked you what you should do with the viewmaster and the reel.") If S appropriately responds after the verbal prompt continue the response chain (Go to Step 2). If S fails to emit the desired response go to Part b.<br>b. T models the desired response (e.g., T cue "S name, you should tell me we put the viewmaster and reel(s) away.") If S appropriately imitates the model, continue response chain (Go to Step 2). If S fails to imitate model, go to Part c. |

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
| | | c. When appropriate T physically guides S through the response. When priming not appropriate T may continue modeling until he/she feels it is no longer appropriate. |

Criterion: Same as Part A

Part C - During this part T gradually fades his/her verbal cues until S can perform the response chain without T cues.

Step 6

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
| Subsequent event to Step 5 (e.g., S has put the reel into the slot of the viewmaster) | "Great. Now look into the viewmaster. Hold it up to the window/light."<br>(T fades his/her cues) | S looks into the viewmaster to view the picture. If S appropriately performs on the task, T records a + on the appropriate data sheet (See Appendix D)[7] and continues the response chain. If S fails to perform the task go to part a.<br>a. T uses a verbal prompt (e.g., "No S name, I said hold the viewmaster up to the light/window and look into the viewmaster to see the picture.") If S correctly performs the task after the verbal prompt, T records VP on appropriate data sheet and continues response chain (Go to Step 7). If S errors go to part b.<br>b. T models the correct response and cue, "I hold the viewmaster up to the window/light and look at the picture. If S imitates the model, T records M on appropriate data sheet and continues response chain (Go to Step 7). If S fails to imitate model, go to part c. |

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[7] Data sheets for all phases are included in Appendix D.

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
| | | c. T physically primes S through the desired response and records P on appropriate data sheet. Continue response chain (Go to Step 7). |

Criterion: S will complete the response chain with no verbal prompts, models and/or primes.

## Phase II

The teaching procedure and criteria for Phase II is the same as Phase I, Part C. T records S's responses on Phase II data sheet. The following anecdote is taken from Phase II instruction and serves as a model example.

### Step 10

S appropriately views the 7 pictures on the reel and puts the reel back in its envelope. S starts to walk away from the play area and T verbally interrupts, e.g., "S name, what do you do when you're done playing with the viewmaster and reel?" and follows the same procedure described in Phase I, Part C.

## D. Cooperative Games

### 1. Summary of Component Skills

As discussed previously, the skills involved in cooperative games consist of at least the six following basic components:

a. recognition of appropriate time and place for a social interaction;
b. initiating interactions;
c. receiving requests for interactions;
d. sustaining interactions;
e. terminating interactions;
f. increasing ability to demonstrate learned social skills in a variety of appropriate environmental settings.

### 2. List of Sample Cooperative Activities

The following list of cooperative games and activities are offered as suggested materials that could be incorporated into a social interaction program. See "Isolative Games - List of Sample Isolative Activities" for a more detailed discussion.

## Games/Activities Commercially Available

Ad-Lib
Aggravation
Air Hockey
Battleship
Billionaire
Bingo
Boob Tube
Bows and Arrows
Bulldog
Bumper Pool
Candy Land
Card Cubes
Cascade
Casino
Casper
Cat and Mouse
Charlie Brown
Checkers
Chess games
Chutes and Ladders
Clue
Come to my House
Cootie
Cross-Up
Deception
Dog-gone
Dollar Bill Poker
Dominoes
Double Dealer
Driver-ed Game
Easy Money
Emergency
Fat Albert
Flat Heads
Flip-it
Foos Ball
Football games
Forest Friends
Frisbee
Game of the States
Gingerbread Man
Gnip Gnop
Go to the Head of the Class
Gunfight at O.K. Corral
Hands Down
Happy Birthday Game
Headache
Hee-Haw
Hexed
Hey Taxi!
Hi-Q
Hockey games
Homestretch
Houndcats
Jeopardy
Jotto
King Oil
Kismet
Life
Lotto
Manhunt
Mary Poppins
Masterpiece
Match Game
Mini-bowl
Monopoly
Mouse Trap
Noah's Ark Game
Numbers Up
On Target
Operation
Paddle Pool
Pachisi
Password
Pendulum Pool
Pick-up Sticks
Pinochio
Pirot Golf
Pit
Pizza Pie
Poker Dice
Pool
Pop Checks
Pop 'n Play
Pow Wow
Price is Right
Prize Property
Probe

## Games/Activities Commercially Available (cont')

Pro-Draft
Pursuit
Qubic
Risk
Robin Hood
Roller Derby
Rolomatic Bridge
Scooby Doo
Scrabble
Sea Diver
Seance
Showdown Poker
Shuffleboard
Simon-Sez
Skee-Whee
Skill Ball
Skittle Bingo
Skittle Bowl
Skittle Pool
Slamback
Sleepy Time
Snoopy Come Home
Soda Pop
Sorry
Spill and Spell
Stratego
Sub Search
Swiss Cheese
Tension
The Great Escape
The Inventor
Tic-Tac-Toe
Tiddly Winks
Tilt
Toss Across
Tournament Backgammon
Trap Shot
Trip Hammer
Tripoley
Tug Boat
Twister
Uncle Wiggily
Vegas
Which Witch?
Whodunit
Wide World of Sports
Winnie the Pooh
Yahtzee

## Card Games

Bridge
Card Tricks
Concentration
Cribbage
Dirty Clubs
Double Solitaire
Euchre
Fish
Flinch
Hearts
I Doubt It
Memory
Old Maid
Poker
Racko
Rummy
Sheeps Head
Snap
Snoopy
War

## Sports Activities

Badmitton
Baseball
Basketball
Boxing
Croquet
Football
Handball
Hockey
Horseshoes
Ping Pong
Racketball
Sledding
Soccer
Tennis
Tobogganing
Track
Volleyball
Wrestling

## Group Activities/Games

Anty Over
Capture the Flag
Cops and Robbers
Dodgeball
Four Square
Hide and Seek
Hopscotch
Jump Rope
King of the Mountain
Leap Frog
Racing
Red Light, Green Light
Spud
Tag
Tic-tac-toe
Tug-o-War
Twenty Questions
What Time is it?

## 3. Sample Task Analysis - Old Maid

A sample task analysis is presented for "Old Maid." Similar task analyses may be constructed for other cooperative games using the presented task analysis as a guide.

Materials Needed: Old Maid cards (1/2 deck)
card rack
cabinet of games
play area

Prerequisites: 1) Visual discrimination of card size pictures
2) Motoric ability to hold cards or pick up cards and place on card rack

Phase I: Teaching S to socially interact and play a game with T.

Part A[8] - T models initiation and selection skills (to be used at the beginning of each instructional period during Phase I).

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 1 | Free time | "(Name) would you like to play Old Maid with me?" | S responds "yes" or some similar appropriate reception of T initiation cues. |
| Step 2 | Subsequent event to Step 1 | "Let's go to the game cabinet/shelf and find the deck of Old Maid cards." | S is acted upon by T modelling his/her verbal command finding/locating the Old Maid cards. |
| Step 3 | Subsequent event to Step 2 | "Why don't we play at that table; that looks like a good spot to play." | T and S take Old Maid cards and go to selected play area. |

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[8] Part A is universal to the task analyses of all the cooperative games. Underlined words may be substituted by terms specific to each game.

Part B[9] - T models termination skills (to be used at the end of each instructional period during Phase I).

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 1 | T and S have completed a game of Old Maid and/or free time is over. | "Now that we are done playing, we should put away the cards. First we stack up the cards like this (T models stacking). Make sure all the cards are going the same way/direction. Will you help me?" | S helps T stack up the cards appropriately following T model. |
| Step 2 | Subsequent event to Step 1 | "Next we put a rubber band around the cards. Do you think you can do it? - try it." | S puts rubber band around deck of cards appropriately. |
| Step 3 | Subsequent event to Step 2. | "Now we are ready to put away the cards. Let's go over to the game cabinet and find a place to put them." | S and T go to game cabinet and put away the cards in an appropriate spot. |

Part C - Teaching S to match card pairs and recognize matched pairs.

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 1 | T lays two cards, right side up, in the card rack in front of S/in S's hand. Then T presents S with a card which matches one of the two cards on the rack/hand. | "Find a card that matches/looks like this (the presented card) card. Put the pair on the table in front of you/in front of your rack." | S will indicate the card that matches by taking the matched pair and placing it on the table in front of S or S's rack. |

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[9] Part B is universal to the task analyses of all the cooperative games.

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 2 | T lays two cards, right side up, in the card rack in front of S. Then T presents S with a card which does not match either of the cards on the S's rack. | "Find a card that mathces/looks like this (the presented card) card." | S will indicate there is no card pairs and put the presented card on his/her card rack. |
| Step 3 | Same arrangements as Step 1 with the following modification: the array of 2 cards is replaced by an array of 4 cards. | Same as Step 1 | Same as Step 1 |
| Step 4 | Same as Step 2 with Step 3 modification. | Same as Step 2 | Same as Step 2 |
| Step 5 | T lays 3 cards, right side up, in the card rack in front of S/in S's hand, 2 of which are a matching pair. | "Do you have any cards that match/look alike/make a pair?" | S will indicate the matching pair by taking the matched pair and placing it on the table in front of S or S's rack. |
| Step 6 | Same arrangement as Step 5, except none of the 3 cards match. | Same as Step 5 | S will indicate there are no cards which match. |
| Step 7 | T lays 6 cards, right side up, in the card rack in front of S/in S's hand. Among the array are 2 matching pairs. | "Do you have any cards that match/look alike/make a pair?" | S will indicate discrimination of the two matched pairs by taking each pair, one at a time, and place them on the table in front of S or S's rack. |

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 8 | Same as Step 7, except none of the cards match. | Same as Step 7 | S will indicate there are no matching pairs with a verbal response. |
| Step 9 | Same as Step 8, with the following addition: T holds in his/her hand or places in card rack 6 cards which all have a matching card in S's hand/rack. | "(Name) pick a card from my hand/rack and see if you have a card that matches/looks like/makes a pair." | S will pick a card from T hand/rack and find the card in his/her own hand or rack which is the picked card's match. S will take the matching pair and place it on the table in front of S or rack. |

Part D - Teaching S to shuffle the cards.

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 1 | S and T sitting in play area. | "I want to see if you can shuffle/mix up the cards. Do you know how to shuffle the cards?" | S responds "yes" go to Step 2.<br>S responds "no" go to Step 3. |
| Step 2 | T gives deck of cards to S. | "(Name), shuffle/mix up the cards for me." | S responds by shuffling the cards using any appropriate method, go to Phase I, Part E).<br>S responds by inappropriately shuffling the cards go to Step 3. |
| Step 3 | T shuffles deck of cards using the most sophisticated method (fanning).[10] | "Watch me shuffle/mix up the cards. Look, all the cards are the same way/direction and the pictures are facing down." | S watches T (appropriately). |
| Step 4 | T gives the deck of cards to S. | "Try to shuffle/mix up the cards just like I did it." | S correctly shuffles the cards, go to Phase I, Part E.<br>S unable to shuffle the cards go to next Step. |

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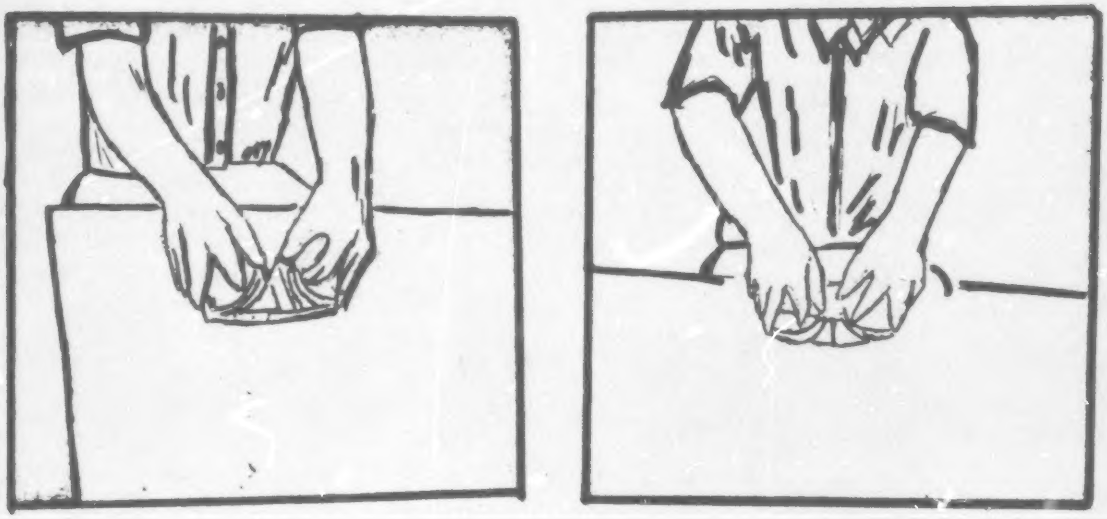
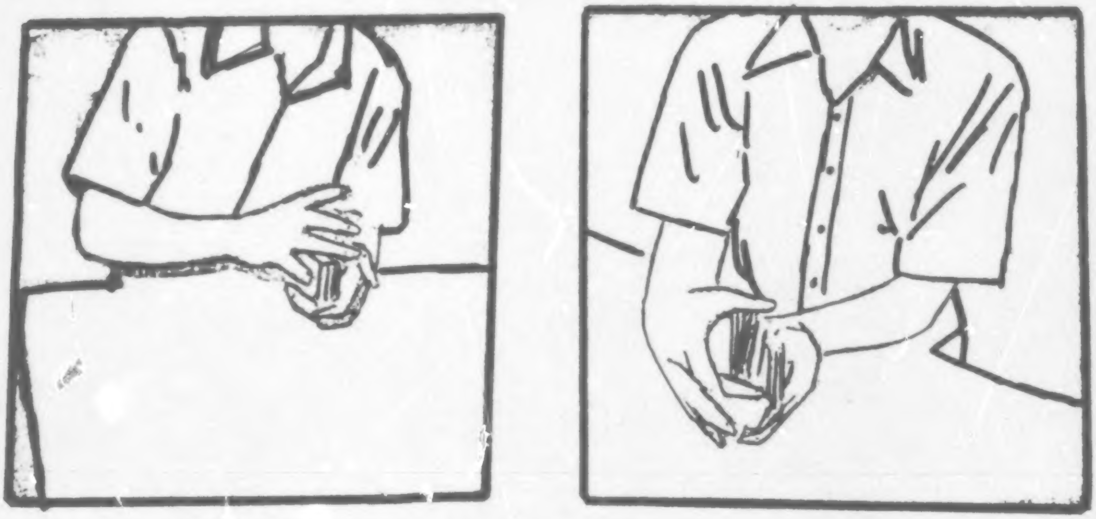
[10] See pages 560-561

[10] The three methods of shuffling which were used in this program are illustrated below:

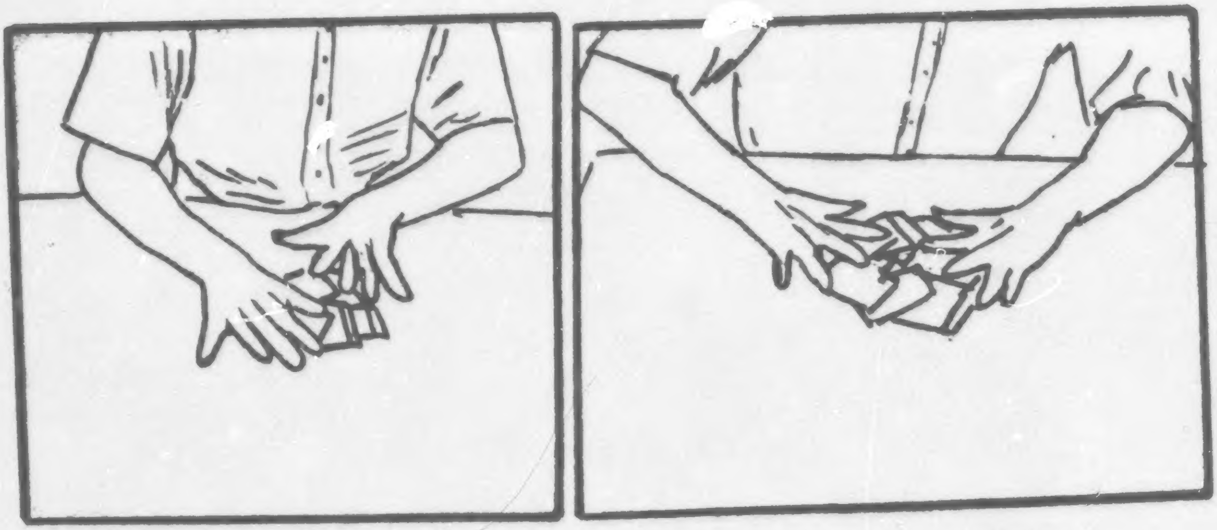
a. most sophisticated method



b. 2nd most sophisticated method



c. least sophisticated method



| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 5 | T shuffles the deck of cards using the 2nd most sophisticated method. | "Watch me shuffle/mix up the cards. Look, all the cards are facing the same way/direction. Now I'll hold all the cards in my right (left) hand and with my left (right) hand I will mix/shuffle them." | S appropriately watches T. |
| Step 6 | T gives deck of cards to S. | Same as Step 4 | Same as Step 4 |
| Step 7 | T shuffles the deck of cards using the easiest method of shuffling. | "Watch me shuffle the cards. First I put them on the table all facing the same way/direction with the pictures facing down. Then I swirl them around and mix them up. Now I pick the cards up and stack them." | S appropriately watches T. |
| Step 8 | T gives deck of cards to S. | Same as Step 4 | S shuffles the cards appropriately. |

Part E - Teaching "Old Maid" by playing the game. T is the dealer and acts upon S

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 1 | Phase I, Part D already completed. | "Now we are ready to play the game/Old Maid. I'll be the dealer this time. Okay?" | S complies verbally, "OK," or similar response. |
| Step 2 | T shuffles cards using method appropriate for S. (See Phase I, Part D.) | "The first thing the dealer does is shuffle the cards." | S watches T shuffle cards. |

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 3 | Subsequent event to Step 2 | "Now the dealer passes out/deals the cards. First I give you a card, then I give one to me, then one to who? Then one to me, one to you, one to who? etc." | S responds "you" or "me" at appropriate times. |
| Step 4 | Subsequent event to Step 3 | "Pick up your cards and put them in your card rack. You don't have to use your card rack but it might be easier because there are so many many cards." | S and T pick up his/her cards and puts them on card rack. |
| Step 5 | Subsequent event to Step 4 | "Find all the cards on your rack that look alike/match/or find all your pairs. Put them on the table in front of your rack." | S and T find his/her own pairs and places them on the table in front of his/her rack. |
| Step 6 | Subsequent event to Step 5 | "Since I dealt/passed out the cards, you get to start. Pick a card from my hand/rack. | S picks a card from T hand/rack. |
| Step 7 | Subsequent event to Step 6 | "See if you have a card that matches/looks like/makes a pair." | S will indicate pair by placing matching cards on table in front of his/her rack. |
| Step 8 | Subsequent event to Step 7 | "Now it's my turn. I'll pick a card from you." | S allows T to pick a card from his/her hand/rack. |
| Step 9 | Continue to play the game as in Steps 6,7 and 8 until all the cards are matched. | | S picks a card from T and allows T to pick a card from himself/herself at appropriate times. |
| Step 10 | T or S has the "Old Maid" left in his/her hand. | "I am the old maid. I am the loser./You are the old maid. You are the loser. Who won the game?" | S appropriately responds "I did" or "you did." |

Part F - Playing the game. S is the dealer.

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 1 | T and S at table with "Old Maid" cards. | "This time you be the dealer. Okay?" | S responds "yes" or with similar response. |
| Step 2 | T gives deck of cards to S. | | S shuffles the cards using method appropriate to his/her ability. (See Phase I, Part D). |
| Step 3 | Subsequent event to Step 2 | | S deals the cards starting by giving a card to T, then to himself/herself, etc. S deals out all the cards appropriately. |
| Step 4 | a. Subsequent event to Step 3 | | a. S picks up his/her cards and puts them in card rack or holds in hand. T does the same. |
| | b. Periodically T will initiate a cue which calls for an acting upon response by S. | "What do I do now?" | b. S picks up his/her cards and puts them in card rack or holds in hand. S tells T to pick up his/her cards and put in rack/hand. |
| Step 5 | a. Subsequent event to Step 4 | | a. S finds his/her pairs and places them on the table in front of his/her card rack. T does the same. |
| | b. Same as Step 4b. | Same as 4b. | b. S finds his/her pairs and places them on the table in front of his/her card rack. S tells T to find his/her pairs and put them on the table. |
| Step 6 | a. Subsequent event to Step 5 | | a. T picks a card from S's hand/rack and places matched pair on table. |

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| | b. Same as 4b. | Same as 4b. | b. S tells T to pick c card from him/her, find its matching card and place th pair on the table. |
| Step 7 | Subsequent event to Step 6 | | S picks a card from T and places matched pair on table. |
| Step 8 | Continue to play the game as in Steps 5 and 6 until all the cards have been matched. | | a. S and T pick cards from each other at appropriate times.<br>b. S tells T to pick a card from him/her and place matched pair on table. |
| Step 9 | T or S has the "Old Maid" left in his/her hand. | | S responds, "I/you are the "Old Maid." That means I/you are the winner." |

Phase II: Teaching S to socially interact and play a game with another S.

Part A - T directs Sx to initiate to Sy. Sy receives the initiation. Sx and Sy acquire the game materials and decide on a play area.

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 1 | Free time | "(Name) why don't you ask (name) to play Old Maid with you?" | Sx responds "OK", "yes" or similar response |
| Step 2 | Subsequent event to Step 1 | | "(Name) will you play Old Maid with me?" or some similar appropriate initiation. |
| Step 3 | Subsequent event to Step 2 | | Sy responds "yes" or similar appropriate reception response. |
| Step 4 | Subsequent event to Step 3 | | Sx or Sy makes some verbal and/or motoric indication they they should get the Old Maid cards and they do so together. |
| Step 5 | Subsequent event to Step 4 | | Sx and Sy decide on a play area. |

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 6 | Subsequent event to Step 5 | | Sx and Sy go to play area. |

Part B - Sx and Sy play a game(s) of Old Maid while T observes.

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 1 | Sx and Sy are sitting at chosen play area. | | Sx or Sy says, "I will be the dealer" or some similar response indicating he/she will be the dealer. |
| Step 2 | Subsequent event to Step 1 | | The dealer (Sx or Sy) shuffles the cards appropriately. |
| Step 3 | Subsequent event to Step 2 | | The dealer (Sx or Sy) deals out the cards appropriately |
| Step 4 | Subsequent event to Step 3 | | Sx and Sy take their respective card hands and appropriately hold them in their hands or place them on the card rack. |
| Step 5 | Subsequent event to Step 4 | | Sx and Sy find all the pairs in their hand/rack and place the pairs on the table/floor, etc. in front of themselves. |
| Step 6 | Subsequent event to Step 5 | | Sx and Sy continue to play the game, picking a card from each other at appropriate times and placing their pairs on the table, floor, etc., as previously analyzed in Phase I, Part F. |
| Step 7 | Subsequent event to Step 6 | | When the game is completed, Sx and Sy should realize the outcome. See footnote, Phase I, Part D (winning). |
| Step 8 | Subsequent event to Step 7 | | Sx and Sy may play again (if time permits) or may decide to terminate the interaction. |

Part C - Sx and Sy terminate their interaction. T observes.

| | Arrangement | T Cue | S and/or T Response |
|---|---|---|---|
| Step 1 | Free time is over or Sy and Sx have decided not to play another game of Old Maid. | | Verbal exchange between Sx and Sy similar to: (Sx) "Thanks for playing with me. I had a good time." (Sy) "Me too." |
| Step 2 | Subsequent event to Step 1 | | Sx and Sy stack up the cards together. |
| Step 3 | Subsequent event to Step 2 | | Sx or Sy puts a rubber band around the deck of cards. |
| Step 4 | Subsequent event to Step 3 | | Sx or Sy puts the deck of cards in an appropriate spot in the game cabinet. |

Phase III: Introducing game modifications, i.e., teaching S to socially interact and play a game with two or more S's.

Part A - T plays Old Maid with two or more S's. Follow Phase I, Part E, using the following modifications:

1) use a whole deck of cards
2) the person to the left of the dealer starts the game by drawing a card from the person to his/her left
3) each player takes his/her respective turn by drawing a card from the person to his/her left
4) there will not always be a card in the S's hand/rack that matches the card he/she draws from another player

Part B - Three or more S's play a game of Old Maid while T observes, as in Phase II, Parts B and C.

### 4. Sample Instructional and Measurement Procedures - Old Maid

The three phases for the instructional procedure for Old Maid were as follows:

Phase I - Structured interaction with T.

Teaching S's to play Old Maid and to initiate, receive, sustain and terminate social interactions with the teacher. When a S reaches criterion on Old Maid and the related social interaction skills in Phase I, S is taught a second game in Phase I while concurrently S being advanced to Phase II.

Phase II - Structured interaction with peers.

Teaching S's to play Old Maid mastered in Phase I and to initiate, receive, sustain and terminate social interactions with peers.

Phase III - Teaching the S's to play Old Maid with modifications, e.g., Old Maid with three or more players, Old Maid with full deck, Old Maid Tournament.

An example of how to apply the instructional procedure will be provided for selected parts of Phase I and II. It is hoped that from these examples it is clear how to apply the procedure to each step of the task analysis of Old Maid.

### Phase I

#### Part A

Step 1

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
| Free time | "(Name) would you like to play Old Maid with me?" | S responds "yes" or some similar appropriate reception of T's initiation. If S appropriately accepts initiation continue response chain (Go to Step 2). If S fails to emit desired response, follow instructional procedure below:<br>a. T uses verbal prompt (e.g., T cue "S name I really would like to play Old Maid with you. Please say "yes" and we'll have a great time/a lot of fun.") If S appropriately accepts initiation after the verbal prompt, continue response chain (Go to Step 2). If S fails to emit desired response, go to part b.<br>b. T models the desired response (e.g., T cue, "I think it would be nice if you would say, 'sure T name I'll play Old Maid with you.") If S appropriately imitates model, continue response chain (Go to Step 2). If S fails to imitate model, go to part c. |

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
| | | c. When appropriate (i.e., a motor response) T physically primes S through the desired response. If priming is not appropriate (i.e., a verbal response) T may continue modeling until he/she feels it is no longer appropriate. |

Criterion: S will complete response chain with or without prompts, models and/or primes.

Part B

Step 2

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
| Subsequent event to Step 1 (i.e., S helped T stack up the cards appropriately following T model) | "Next we put a rubber band around the cards. Do you think you can do it? - try it." | S puts rubber band around deck of cards appropriately. If S appropriately performs the task continue the response chain (Go to Step 3). If S fails to perform the task, go to part a.<br>a. T uses a verbal prompt. (e.g., T cue "Come on S name see if you can put the rubber band around the cards.") If S correctly performs task after verbal prompt continue response chain (Go to Step 3). If S errors go to part b.<br>b. T models correct response and (e.g.) cue "Put the rubber band around the cards like this. Do you think you can do it now? Try it." If S imitates model continue response chain (Go to Step 3). If S fails to imitate model, go to part c.<br>c. T (when appropriate) physically primes S through the desired response. Continue the response chain (Go to Step 3). |

Criterion: Same as Part A.

## Part C

### Step 1

| Arrangement | T Cue | S and/or T Response |
|---|---|---|
| T lays two cards, right side up, in the card rack in front of S/in S's hand. Then T presents S with a card which matches one of the two cards on the rack/hand. | "Find a card that matches/looks like this (the presented card) card. Put the pair on the table in front of you/in front of your rack." | S will indicate the card that matches by taking the matched pair and placing it on the table in front of S or in S's rack. If S correctly indicates matched pair T records + on appropriate data sheet (See Appendix E[11]) and continues response chain (Go to Step 2). If S errors follow instructional procedure below:<br>a. T uses verbal prompt (e.g., T cue "No (S name) find the card that looks like this (the presented) card.") If S correctly indicates matched pair after verbal prompt, T records VP on appropriate data sheet and represents original task (See part c criterion). If S errors go to part b.<br>b. T models correct response and (e.g.) cues "(S name) this card (the presented card) looks like this card, not like this card." Repeat original cue. If S correctly imitates model, T records M on appropriate data sheet and represents original cue (Observe criterion). If S errors go to part c.<br>c. T (when appropriate) physically primes S through correct response and repeats T cue. Then T repeats original cue. If S correctly indicates matched pair, T records P on appropriate data sheet. If S errors, repeat priming.[12] |

Criteria: If S correctly performs task continue response chain (Go to next step). If S fails T will follow procedure after error until S correctly performs the repeated task in three consecutive trials; then continue response chain.

---

[11] Data sheets for all phases are included in Appendix E.

[12] Continued priming may indicate that S fails to perform (a) prerequisite skill(s).

## Part D

Part D is basically an assessment tool for T. T will be able to evaluate S's ability to shuffle the cards. If S correctly shuffles cards, T will record this observation on appropriate data sheet. T will model this method of shuffling throughout instruction (Part E, F). If S does not correctly shuffle the cards T will teach the least sophisticated method of shuffling by following teaching procedure in Steps 5, 6, 7, 8. T will model these steps. If S fails to imitate model, then T primes using the same cues.

## Part E and Part F

The same teaching procedure applies for both Parts E and F. Therefore, Part F, Step 3 follows as a general example.

## Part F

### Step 3

| Arrangement | T Cue | T and/or S Response |
|---|---|---|
| Subsequent event to Step 2 (i.e., S has shuffled the cards using method appropriate to his/her ability.) | | S deals the cards starting by giving a card to T, then to himself/herself, etc. S deals out all the cards appropriately. If S correctly deals out the cards, T records + on appropriate data sheet and continues response chain (Go to Step 4). If S errors follow instructional procedure below:<br>a. T uses verbal prompt (e.g., T cue "S name remember when you deal, the first card goes to me, then to you, then to me.") T arranges situation as that prior to S error and verbally instructs S to continue dealing. If the S continues correctly, then T records VP on data sheet and continues response chain (Go to Step 4). If S errors after verbal prompt, go part b.<br>b. T models correct response by (e.g., T cue "You're the dealer. First you give me a card (waits). Now you. Now me, etc.") T arranges situation as prior to S error and verbally instructs S to continue dealing. If the S continues correctly, then T records M on appropriate data sheet and continues response chain (Go to Step 4). If S errors after model, go to part c. |

| Arrangement | T Cue | T and/or S Response |
|---|---|---|
|  |  | c. T physically primes S through task and cues (e.g., same cues as part b). Then T arranges situation as that prior to S error and verbally instructs S to continue dealing. If S continues correctly then T records P on appropriate data sheet and continues response chain (Go to Step 4). If S errors, continue priming. |

Criteria: S should be able to complete Part E with no models or primes and no more than 3 verbal prompts and Part F with no verbal prompts, models, or primes.

### Part II

The teaching procedure and criteria for all of Phase II is the same as that of Phase I, Part F. T records Sx and Sy's responses on Phase II data sheet. The following is an anecdote taken from Phase II instruction and serves as an example.

### Part B

### Step 3

The dealer appropriately deals the cards and response chain continues (Step 4). Dealer errors T interrupts verbally, e.g., "I don't think you're dealing the way we learned" and follows same proceudre described in Phase I, Part E and F.

### E. Results of Teaching Phases I, II and III for Isolative and Cooperative Games

**Class A:**

Table 10 indicates where each *S* was in the program at the end of the school year. The last check indicates *S* was in that phase or had just completed it, and the check(s) before the last check indicate *S* had completed that phase(s).

As shown in Table 10, $S_1$, $S_2$, $S_3$ and $S_6$ were in Phase III for Old Maid (They were playing with three or more players). $S_4$ was still in Phase I (learning how to play Old Maid) and $S_5$ had just completed Phase II (structured interaction with another peer).

$S_5$ completed Phase I for Old Maid in 7 trials, and $S_2$, $S_3$ and $S_6$ in 3 trials. $S_5$ reached criterion on Phase II in 5 trials, $S_1$ and $S_2$ in 2 trials and $S_3$ and $S_6$ in just 1 trial. Thus, *S*'s took fewer trials to reach criterion in Phase II than in Phase I.

$S_1$, $S_2$, $S_3$ and $S_6$ received instruction on Bingo and completed all three phases. $S_3$ completed Phase I in 7 trials, $S_1$ and $S_2$ in 6 trials and $S_6$ in 5 trials. $S_3$ and $S_6$ reached criterion for Phase II in 2 trials and $S_1$ and $S_2$ in 1 trial. Again, *S*'s took fewer trials to reach criterion in Phase II than Phase I. As an additional activity all *S*'s were involved in a Bingo tournament which lasted four days. The teacher was the banker and ran the tournament for one half hour each day. Every time *S*'s got bingo they recorded it on a Bingo tournament chart. On the fourth and last day of the tournament, the two *S*'s with the most wins, $S_2$ and $S_3$, had a play-off for the championship. $S_2$ won the tournament and $S_3$ was declared the runner-up. Both $S_2$ and $S_3$ received ribbons. The authors feel this was an excellent learning experience for the *S*'s in that they learned to accept the fact that only one person can win and someone must lose.

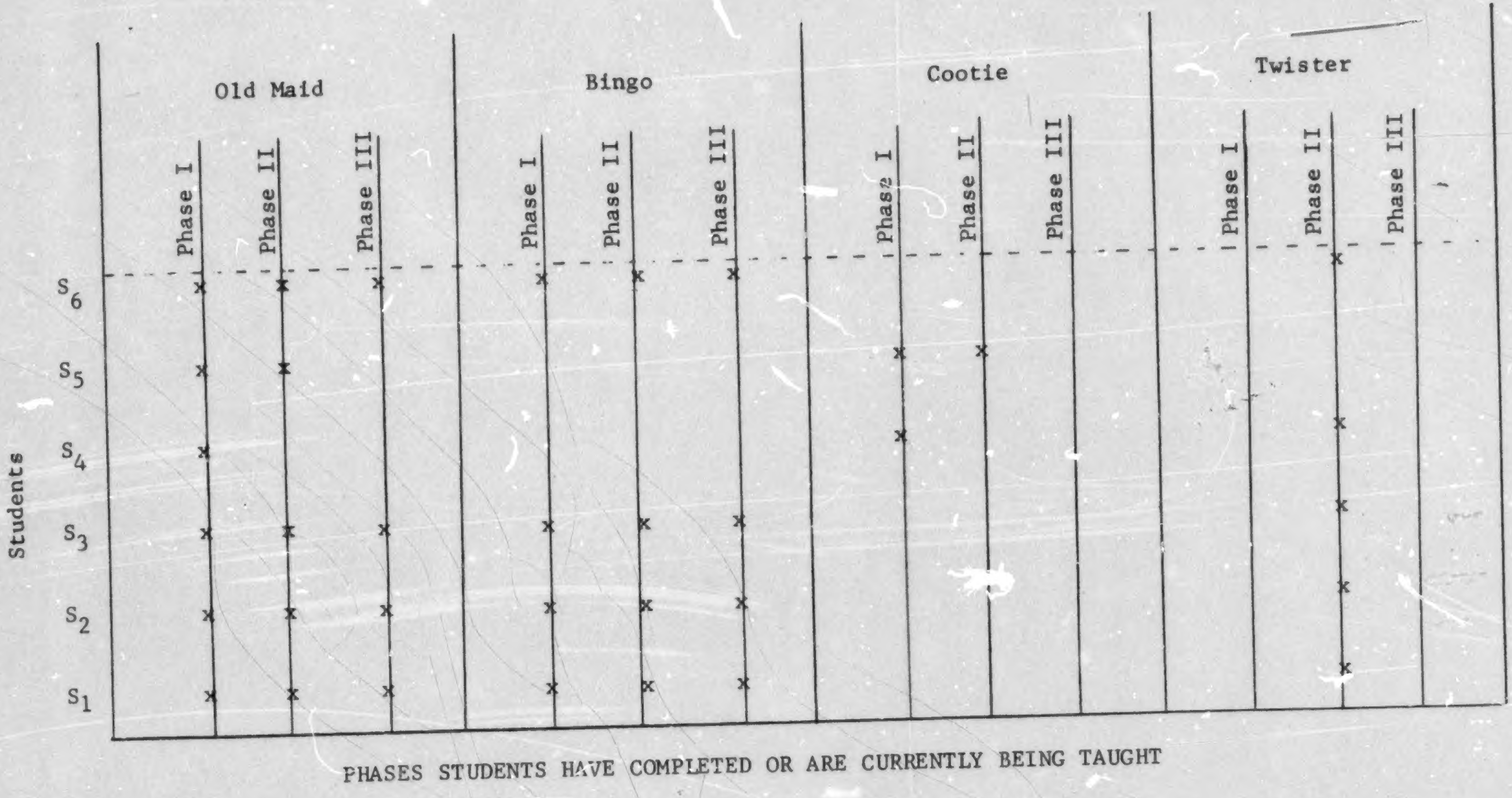
Cootie was taught to $S_4$ and $S_5$. The authors felt it was appropriate to teach Cootie to $S_5$ because it was one of the few games he chose to play during his free time. However, he always played it by himself (isolatively) using his own rules. In order to increase the cooperative game and interaction skills of both $S_4$ and $S_5$, Cootie was taught to them concurrently. At first $S_5$ was very persistent in playing by "his" rules and not by the rules of the game. However, he learned to play by the rules of the game after a few trials. $S_5$ completed Phase I in 5 teaching trials and $S_4$ is still in Phase I after 8 trials.

Finally one instructional trial for Phase I for Twister was administered to $S_1$, $S_2$, $S_3$, $S_4$ and $S_6$.

**Class B:**

As indicated by Table 11 all students have completed Phases I, II, and III of Old Maid. That is, $S_8$, $S_9$, $S_{10}$, $S_{11}$ completed Phase I in 3 trials, and $S_7$ in 6 trials. None of the students had problems transferring Phase I skills to Phase II. For instance, $S_9$, $S_{10}$ and $S_{11}$ reached criteria on Old Maid in one trial (no instruction). After meeting criterion students were often given review trials. For example, $S_8$ was instructed on and reached criteria for Phase I and it was a number of days before $S_8$ could receive Phase II instruction. Thus, prior to teaching Phase II, *T* repeated Phase I with $S_8$ to insure the necessary skills were still present. The review trial showed $S_8$ still retained Phase I skills. An Old Maid tournament was organized as a Phase II

## TABLE 10
## EVALUATION OF WHERE STUDENTS ARE IN THE PROGRAM
(Class A)



| Students | Old Maid Phase I | Old Maid Phase II | Old Maid Phase III | Bingo Phase I | Bingo Phase II | Bingo Phase III | Cootie Phase I | Cootie Phase II | Cootie Phase III | Twister Phase I | Twister Phase II | Twister Phase III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $S_6$ | x | x | x | x | x | x |  |  |  |  | x |  |
| $S_5$ | x | x |  |  |  |  | x | x |  |  |  |  |
| $S_4$ | x |  |  |  |  |  | x |  |  |  | x |  |
| $S_3$ | x | x | x | x | x | x |  |  |  |  | x |  |
| $S_2$ | x | x | x | x | x | x |  |  |  |  | x |  |
| $S_1$ | x | x | x | x | x | x |  |  |  |  | x |  |

PHASES STUDENTS HAVE COMPLETED OR ARE CURRENTLY BEING TAUGHT

## TABLE 11
## EVALUATION OF WHERE STUDENTS ARE IN THE PROGRAM
## (Class B)

| Students | Old Maid |  |  | Darts |  |  | Cootie |  |  | Fish |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Phase I | Phase II | Phase III | Phase I | Phase II | Phase III | Phase I | Phase II | Phase III | Phase I | Phase II | Phase III |
| $S_{12}$ | x | x | x | x | x | x | x |  |  | x |  |  |
| $S_{11}$ | x | x | x | x | x | x | x |  |  | x |  |  |
| $S_{10}$ | x | x | x | x | x | x | x |  |  | x |  |  |
| $S_9$ | x | x | x | x | x | x | x |  |  | x |  |  |
| $S_8$ | x | x | x | x | x | x | x |  |  | x |  |  |
| $S_7$ | x | x | x | x | x | x | x |  |  | x |  |  |

PHASES STUDENTS HAVE COMPLETED OR ARE CURRENTLY BEING TAUGHT activity. The student who won the most games within a weeks time was taken to McDonald's for lunch. It was the students' responsibility to initiate and receive invitations to play these tournament games. Although no initiations to play Old Maid were demonstrated during baseline assessment (Table 8) there were 41 separate initiations and receptions to play Old Maid during the tournament.

Baseline information, as well as teachers' observations, indicated a student interest in darts. Therefore, it was decided that darts should be taught. When students completed Phase I and II of darts Phase III included a round robin tournament. This tournament was constructed to afford students the opportunity to challenge the winner on any given day to play darts the following day. Making such arrangements prior to performing the activity is a demonstration of a sophisticated and highly appropriate social interaction. At the end of the school year students were all learning Cootie and Fish in small groups.

## V. Limitations of the Authors' Program and Implications for Future Programs

This study suggests a tenable instructional model for teaching selected social interaction skills to severely handicapped individuals. Although the results of this study indicate that the students learned social interaction skills several limitations should be noted. These limitations included: a) validity of baseline measures; b) number and variety of skills taught, c) CA appropriateness of skills taught; and d) demonstration of skills in a variety of appropriate environments.

### a. Baseline Measures

The purpose of free play baseline measures was to assess students' social interaction skill repertoires. That is, to collect information indicating the number, frequency and duration of games each student played; the appropriateness of interactions surrounding each game, and which peers interacted together. Three-day pre-instructional baseline assessments were collected via video-tape. The information compiled from these baseline assessments aided in the evaluation of student interaction skill repertoires. However, three days of baseline collection was inadequate. That is, in authors' judgement the collected data did not accurately assess the students actual social interaction skill repertoires.

For example, one fourteen-year-old student spent the entire first two baseline periods playing with a toy music clock alone at his desk. However, on the third day he appropriately initiated an interaction with two peers. Then he went to the game area, obtained needed materials and found an area to play. Next he proceeded to teach his peers "dominoes." Finally, he appropriately terminated the interaction. Obviously, this student had more skills than he demonstrated in the first two days of baseline. Thus, decisions based on this student's three day baseline may have been quite inappropriate. Baseline measures over a longer period of time would allow more opportunities for students to demonstrate skills. Fortunately, other baseline measures (additional assessment) which provided specific pre-instruction game skill information, were obtained during the teaching of Phase I.

### b. Number and Variety and Skills Taught

As indicated in the results (Tables 10 and 11) students did learn interaction skills. However, the purpose of this program was to teach a range of interaction skills. The range taught was limited due to a lack of time to implement all the programs we had hoped to. Provided sufficient time more games and skills could have been taught and the number of games and activities within each of the interaction levels could have been increased. In addition, more indoor and outdoor activities, team games, imaginative play, etc. should have been an integral part of the program.

c. CA Appropriateness of Games

Another limitation of the program was that the games taught were not all CA appropriate. For instance, Old Maid is not CA appropriate for an eighteen-year-old. The authors posit that with additional training over an extended period of time the students could be taught tasks which more closely approximate CA appropriate tasks.

d. Demonstration of Skills in a Variety of Appropriate Environments

Daily school programming included the teacher providing tasks and activities, such as juice time, library trips, academics, which afforded students the opportunity to demonstrate and practice many of the interaction skills across environmental configurations. Future programming should provide more opportunities for students to use social skills across environmental configurations. That is more opportunities to teach interaction skills in recreational, home-living and vocational environments should be made available.

The preceeding limitations may be minimized by attending to the following summary statements.

1. The program should begin as early in the school year as possible.
2. Giving the program a high priority and allowing adequate time for the program would create the opportunity to collect more useful baseline information.
3. More useful baseline information should lead to more appropriate planning for individual student needs.
4. Adequate programming time would also allow a greater number and variety of games and social interaction skills to be taught.
5. Teaching more games would allow more instruction on activities at different social interaction levels.
6. The younger the student is exposed to a social interaction program the easier it will be to present tasks appropriate to the student's level of intellectual functioning and CA.

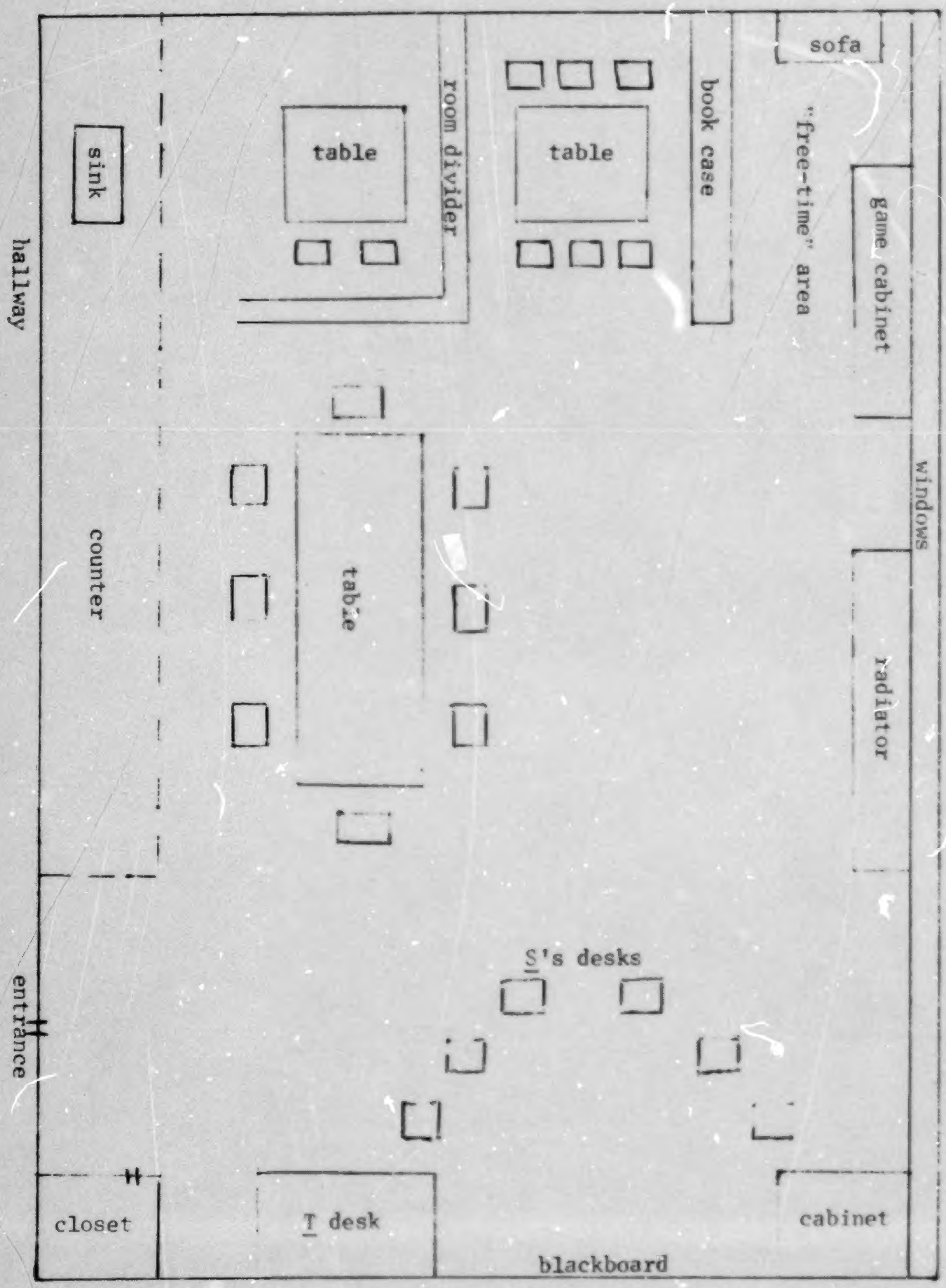
## VI. Appendix

### APPENDIX A

Appendix A contains the room design for Class A and Class B.

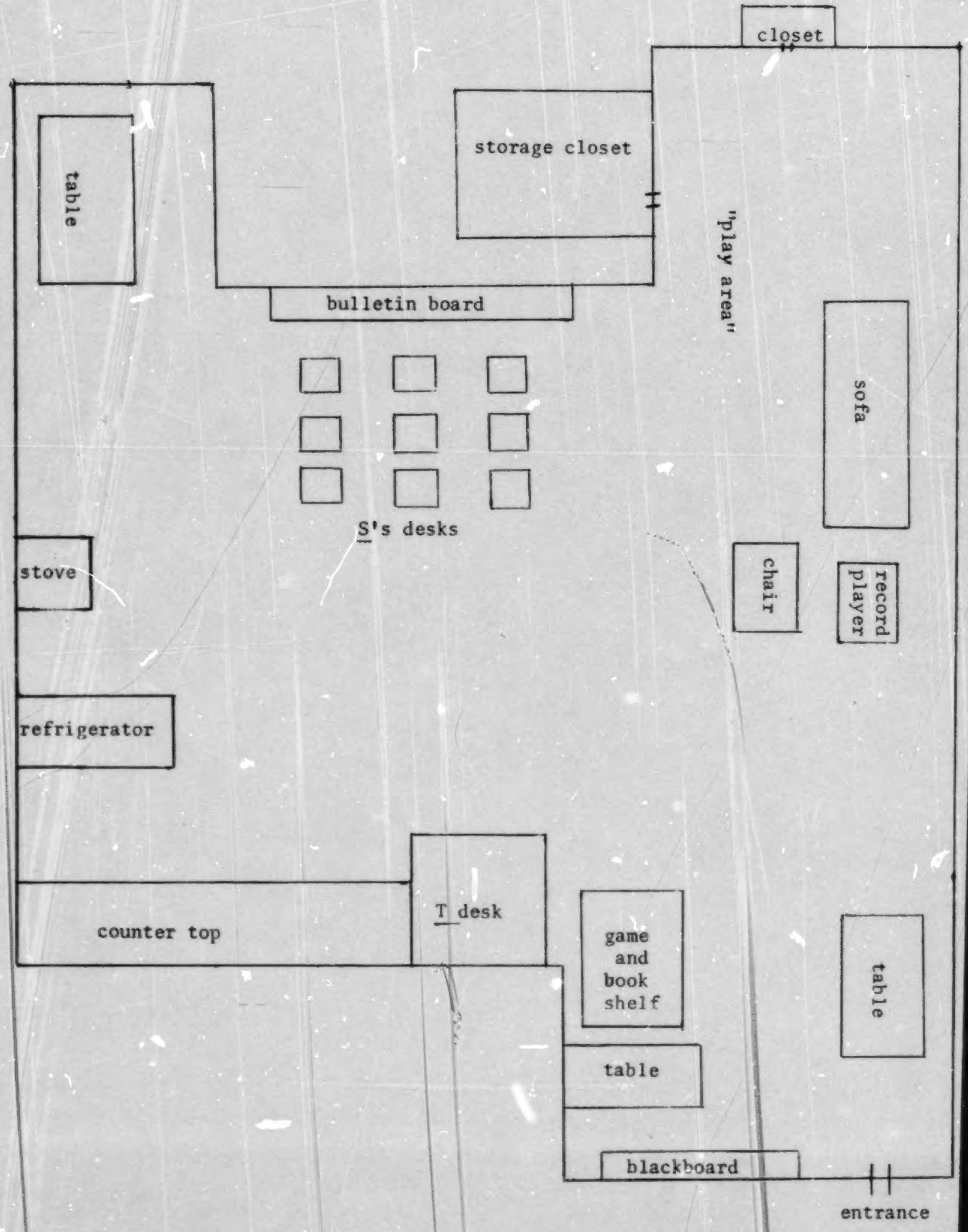
## ROOM DESIGN

Class A


sofa
room divider
table
table
book case
"free-time" area
sink
game cabinet
hallway
windows
counter
table
radiator
S's desks
entrance
closet
T desk
cabinet
blackboard

## ROOM DESIGN

Class B


closet
storage closet
table
bulletin board
"play area"
sofa
S's desks
stove
chair
record player
refrigerator
T desk
counter top
game and book shelf
table
table
blackboard
entrance

## APPENDIX B

Sample data sheet used for baseline procedures. The same data sheet was used for the "free-play" baseline, structured baseline and rebaseline.

| STUDENT | A | B | C | D |
|---|---|---|---|---|
| Initiation | | | | |
| Receive | | | | |
| Activity | | | | |
| Level of play | | | | |
| Sustain | | | | |
| Terminate | | | | |
| Interaction | | | | |

| STUDENT | A | B | C | D |
|---|---|---|---|---|
| Initiation | | | | |
| Receive | | | | |
| Activity | | | | |
| Level of play | | | | |
| Sustain | | | | |
| Terminate | | | | |
| Interaction | | | | |

| STUDENT | A | B | C | D |
|---|---|---|---|---|
| Initiation | | | | |
| Receive | | | | |
| Activity | | | | |
| Level of play | | | | |
| Sustain | | | | |
| Terminate | | | | |
| Interaction | | | | |

| STUDENT | A | B | C | D |
|---|---|---|---|---|
| Initiation | | | | |
| Receive | | | | |
| Activity | | | | |
| Level of play | | | | |
| Sustain | | | | |
| Terminate | | | | |
| Interaction | | | | |

DATE:

OBSERVER:

TOTAL MIN. OF PLAY PERIOD:

TYPE OF INTERACTION SITUATION:

## APPENDIX C

Summary data sheets for baseline procedures. The summary data sheet summarizes the data recorded from "free-play" baseline, structured baseline and rebaseline in terms of initiating, receiving, level of toy play, level of social play, sustaining and terminating. The summary data sheet (percentages) reduces the above data, for "free-play" baselines only, to percentages.

## SUMMARY DATA SHEET

Student ____________

G = general
UO = unoccupied
O = observation
AI = attempted interaction
AP = appropriate
A = autistic
P = parallel
AU = acted upon
PD = peer disapproval
I = isolative
C = cooperative
/ = unable to score

| Initiate | Receive | Activities | Level of Toy Play | Level of Social Play | Duration | Terminate | Sociogram |
|---|---|---|---|---|---|---|---|
| | | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a. initiate to:<br>b. receive from: |
| | | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h.<br>i.<br>j. | a. initiate to:<br>b. receive from: |
| | | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h. | a.<br>b.<br>c.<br>d.<br>e.<br>f.<br>g.<br>h. | a. initiate to:<br>b. receive from: |

## SUMMARY DATA SHEET (PERCENTAGES) for "free play" periods only

Student ____________

G = general
UO = unoccupied
O = observation
AI = attempted interaction
Ap = appropriate
A = autistic
P = parallel
AU = acted upon
Pd = peer disapproval
I = isolative
C = cooperative

| Initiate | Receive | Activities | | |
|---|---|---|---|---|
| | | Activity | No. of times engaged in activity | % of time engaged in a specified activity* |
| No. of "free play" sessions ____ | No. of initiations from others ____ | a. | | |
| No of initiations ____ | No. of initiations accepted ____ | b. | | |
| Mean number initiations per session ____ | % = ____ | c. | | |
| No. of appropriate initiations ____ | No. of initiations rejected ____ | d. | | |
| No. of inappropriate initiations ____ | % = ____ | e. | | |
| % = ____ approp. | No. of initiations received appropriately ____ | f. | | |
| % = ____ inapprop. | No. of initiations received inappropriately ____ | g. | | |
| | % = ____ approp. | h. | | |
| | % = ____ inapprop. | i. | | |
| | | j. | Total = ____ of all activities | |

* % determined by dividing total number of all activities into the number of times engaged in a specified activity.

Student ____________

## SUMMARY DATA SHEET (PERCENTAGES) con't.

| Level of Toy Play | | | Level of Social Play | | | Sustain | Terminate |
|---|---|---|---|---|---|---|---|
| Level | No. of times | % | Level | No. of times | % | Total no. of times engaged in activities<br>____<br>Total time engaged in activities in all free play sessions<br>____ min.<br>Mean number = ____ minutes per activity | No. of scorable terminations<br>____<br>No. of appropriate terminations<br>____<br>% =<br>No. of inappropriate terminations<br>____<br>% = |
| G | | | UO | | | | |
| AP | | | A | | | | |
| | TOTAL = | | O | | | | |
| | | | I | | | | |
| | | | P | | | | |
| | | | C | | | | |
| | | | AU | | | | |
| | | | PD | | | | |
| | | | | TOTAL = | | | |

# APPENDIX D

Example data sheet for "Viewmaster"

## Data Sheet - Viewmaster

### Phase I

Subject: ____________________

+ - S responds appropriately
VP - T supplies verbal prompt
M - T models the response
P - T physically guides S through the response

Part A and B - Data sheet not necessary

Part C

| | Number of verbal prompts | Number of models/primes |
|---|---|---|
| TRIAL 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |

### Phase II

Subject: ____________________

+ - S responds appropriately
VP - T supplies a verbal prompt
M - T models the response
P - T physically guides S through the response

| | TRIALS | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| S receives or rejects T's initiation (if S receives, continue recording data) | | | | | |
| S takes the reel from T | | | | | |
| S goes to the game shelf and finds the viewmaster | | | | | |
| S finds a spot near a light or window | | | | | |
| S takes the reel out of the envelope | | | | | |
| S puts the reel in the slot keeping the top part sticking out | | | | | |
| S looks into the viewmaster to see the picture | | | | | |
| S pulls the trigger to see each of the 7 pictures on the reel | | | | | |
| S takes the reel out of the viewmaster and puts it back in the envelope | | | | | |
| S terminates his/her play behavior with the viewmaster and reel | | | | | |

## APPENDIX E

Example data sheet for "Old Maid".

# Data Sheet - Old Maid
Phase I

Subject: ____________________

+ - S responds appropriately
VP - T supplies a verbal prompt
M - T models the response
P - T physically guides S through the response

Part A and B - Data sheet not necessary

Part C

| | TRIALS 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| S matches a presented card to a card on his/her rack/hand. | | | | | |
| S indicates he/she does not have a card on his/her rack/hand that matches a presented card. | | | | | |
| S matches a presented card to a card on his/her rack/hand. | | | | | |
| S indicates he/she does not have a card on his/her rack/hand that matches a presented card. | | | | | |
| S finds a pair on his/her rack/hand. | | | | | |
| S indicates that there are no pairs on his/her rack/hand. | | | | | |
| S finds two pairs on his/her rack/hand. | | | | | |
| S indicates that there are no pairs on his/her rack/hand. | | | | | |
| S picks a card from T and finds its match on his/her rack/hand. | | | | | |

Part D

Method of shuffling S able to do: ____________________

Part E

| | TRIALS 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Number of models | | | | | |
| Number of primes | | | | | |

(tally)

Data Sheet - Old Maid
Phase I
(con't)

Subject: ____________________

**Part F**

| | Number of verbal prompts | Number of models/primes | S AU T |
|---|---|---|---|
| Game 1 | | | 1.<br>2.<br>3.<br>4.<br>5. |
| Game 2 | | | 1.<br>2.<br>3.<br>4.<br>5. |
| Game 3 | | | 1.<br>2.<br>3.<br>4.<br>5. |

(tally)

6

# Data Sheet - Old Maid

## Phase II

Sx: __________

Sy: __________

+ - S responds appropriately
VP - T supplies a verbal prompt
M - T models the response
P - T physically guides S through the response

Parts A through C

| | Trials 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Sx initiates to Sy | | | | | |
| Sy receives initiation | | | | | |
| Sx and Sy get Old Maid cards | | | | | |
| Sx and Sy decide on play area | | | | | |
| Sx and Sy go to play area | | | | | |
| Sx or Sy decides to be dealer | | | | | |
| Sx or Sy (dealer) shuffles the cards | | | | | |
| Sx or Sy (dealer) deals the cards | | | | | |
| Sx and Sy hold cards in hand/place in rack | | | | | |
| Sx and Sy find their pairs and place them on table, floor, etc. in front of themselves | | | | | |
| Sx and Sy play the game (tally) | VP<br>M<br>P | VP<br>M<br>P | VP<br>M<br>P | VP<br>M<br>P | VP<br>M<br>P |
| Sx and Sy terminate the interaction | | | | | |

## APPENDIX F

Evaluation sheets for Class A and Class B.

EVALUATION SHEET

Class A

Game: ____________________

| Subjects | Phase I - Teaching S the Game | Phase II - Structured Pairing with Other S | Phase III - Modifications |
|---|---|---|---|
| S1 | | | |
| S2 | | | |
| S3 | | | |
| S4 | | | |
| S5 | | | |
| S6 | | | |

Game: ____________________

| Subjects | Phase I - Teaching S the Game | Phase II - Structured Pairing with Other S | Phase III - Modifications |
|---|---|---|---|
| S1 | | | |
| S2 | | | |
| S3 | | | |
| S4 | | | |
| S5 | | | |
| S6 | | | |

Game: ____________________

| Subjects | Phase I - Teaching S the Game | Phase II - Structured Pairing with Other S | Phase III - Modifications |
|---|---|---|---|
| S1 | | | |
| S2 | | | |
| S3 | | | |
| S4 | | | |
| S5 | | | |
| S6 | | | |

## EVALUATION SHEET

Class B

Game: ____________________

| Subjects | Phase I - Teaching S the Game | Phase II - Structured Pairing with Other S | Phase III - Modifications |
|---|---|---|---|
| S7 | | | |
| S8 | | | |
| S9 | | | |
| S10 | | | |
| S11 | | | |
| S12 | | | |

Game: ____________________

| Subjects | Phase I - Teaching S the Game | Phase II - Structured Pairing with Other S | Phase III - Modifications |
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| S7 | | | |
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| S10 | | | |
| S11 | | | |
| S12 | | | |

Game: ____________________

| Subjects | Phase I - Teaching S the Game | Phase II - Structured Pairing with Other S | Phase III - Modifications |
|---|---|---|---|
| S7 | | | |
| S8 | | | |
| S9 | | | |
| S10 | | | |
| S11 | | | |
| S12 | | | |

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